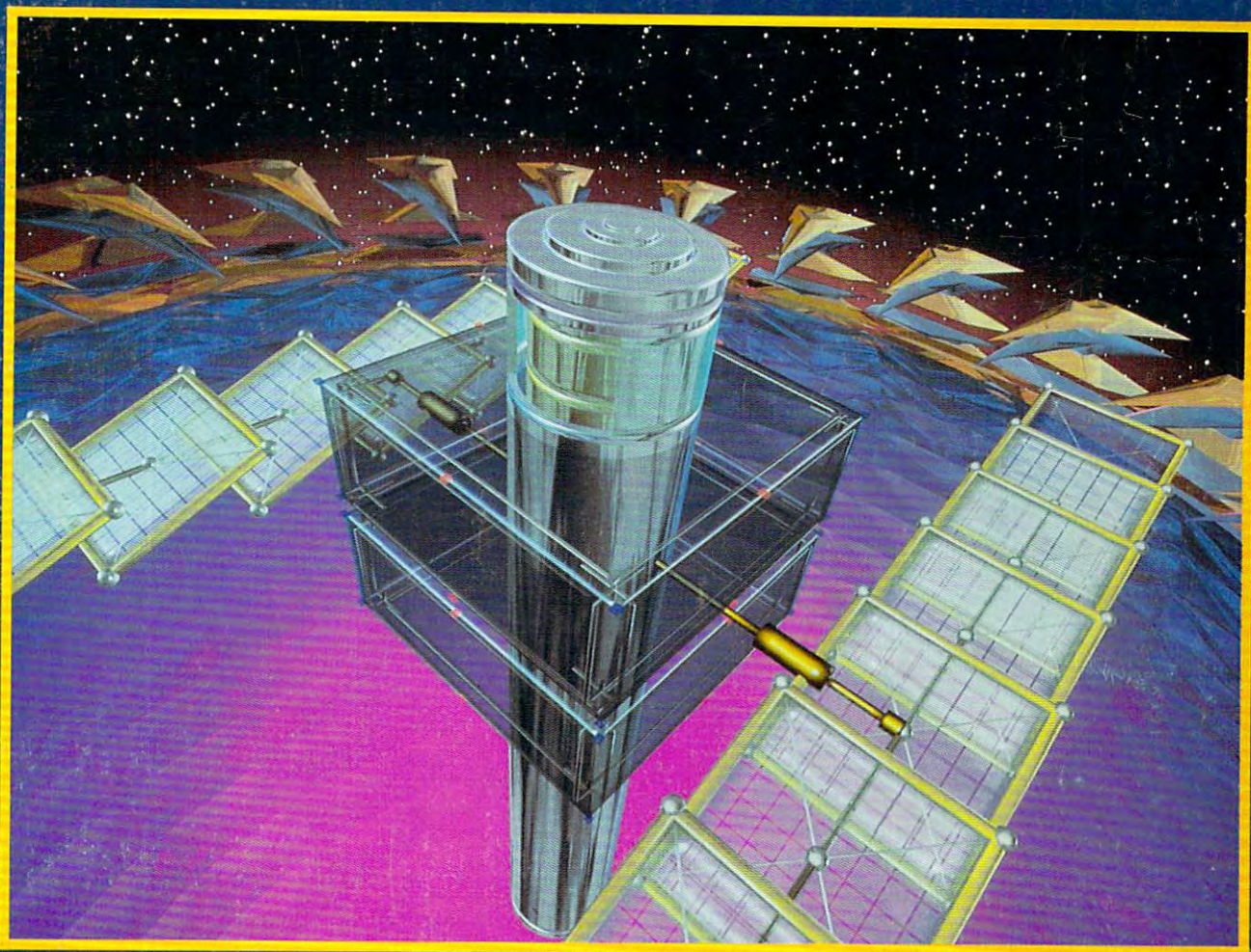


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JUNE 1991



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COMPUTE

JUNE 1991

VOLUME 13 • NO. 6 • ISSUE 130

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PETER SCISCO
Multimedia isn't a new phenomenon, but it could usher in a new era of computing. We have to recognize that it's more than just the sum of its parts.

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ALAN R. BECHTOLD
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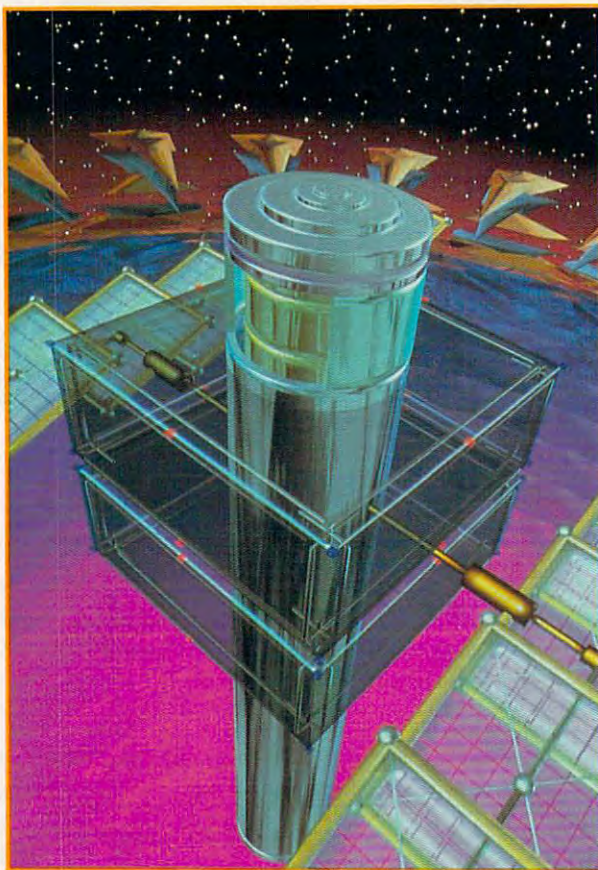
DAVID ENGLISH
Live video in a window on your PC screen? Six hundred megabytes of information on a slender 5-inch disc that can simultaneously play back text, graphics, video, animation, recorded sounds, and synthesized music? Those are just some of the promises of a powerful set of extensions to *Windows 3.0* that Microsoft will release this year.

SharePak 28

RICHARD C. LEINECKER
This month's *SharePak* disk contains two powerful programs to help you cultivate a healthy body and a third program that might help you schedule events so that they are more harmonious with your life.

Virtual Reality 30

GREGG KEIZER
Virtual reality describes a swarm of futuristic technologies with even more futuristic applications. Among the dreams of virtual reality are robots to probe crippled fission reactors; classrooms that can explore the inner workings of thunderstorms, combustion engines, or the nuclear furnace of the sun; and entertainment for millions.



ON THE COVER

This issue's cover is an image from *The Mind's Eye—A Computer Animation Odyssey*, a 40-minute video by Seattle-based Miramar Productions. Brad Hunt and Mario Kamberg used a Cray XMP supercomputer to create the image, which is completely computer generated and has a resolution of 8,000 × 6,000 with 4,000,000 colors.

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TEST LAB

Nine Printers in Grueling Tests 33

In this issue's Test Lab we benchmark and review a range of dot-matrix, bubble-jet, color, and laser printers. Included are Canon's BJ-10e and BJ-330, Fujitsu's DL4600, the NEC Pinwriter P6200, The Printer Works JetScript-CX, Qume's CrystalPrint Express and CrystalPrint Publisher II, and Star Micronics' NX-1020 Rainbow and NX-2420 Multi-Font.

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Supercharge Your PC 62

STEVEN J. VAUGHAN-NICHOLS
If your PC isn't fast enough, don't give up on it; supercharge it! By adding a cache, more memory, a faster hard disk, or any combination of these, you can take almost any PC from a tried-and-true 4.77-MHz machine to a state-of-the-art 386 and turbocharge it!

On Disk 69

JOYCE SIDES
Power users and novices alike will appreciate the collection of super utilities found on this issue's disk. You can do anything from repairing a disk's file allocation tables to restoring the setup data in your CMOS memory. You can even use these programs to test your floppies to see if there are any system, data, or file errors.

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READERS
Getting 400 percent from *PageMaker*, preventing the most common forms of viruses from infecting your boot sector, and tuning up your batch files.

Programming Power 73

TOM CAMPBELL
QuickBASIC used to be the only BASIC for PC programmers. But there's a new kid on the block that's going to give Microsoft a run for its money. This new BASIC is the reincarnation of *Turbo Basic* with a new name: *PowerBASIC*.

Hardware Clinic 75

MARK MINASI
The very power that gives our PCs life can kill or cripple them. Here's a hands-on guide to the hardware that can protect your PC from surges, spikes, and other power nasties.

Michael S. Hedgepeth
14020 LOCUST STREET · PHILADELPHIA · PA 19100

21 January 1991

Ed Bates
Bates Industries, Inc.
241 Batesway Drive
Kenney, PA 02123

Dear Ed:

Well, we're finally settled in.

The kids are registered in school. We've unpacked everything but the pictures. And I'm in my new digs.

Wonder of wonders, I actually have a window!

And -- as you can see -- no more 9-pin printer. Funny thing, one morning I sat down at my desk and there was a brand new Panasonic printer hooked up to the PC. Oh well, what are birthdays for? It's an 1123. And it has a lot of the same features as the 1124 you use at the shop. Just more affordable.

I love it. That is, when I can get to it. Barbara's putting all her recipes on computer. And John's at the age where it seems like there's a term paper due every week.

Well, gotta run. You're not the only one with deadlines to meet.

Give my best to everyone in the department. Tell Pete he still owes me a beer. You collect it for me.

Can't wait for you and Ann to come visit.

Bye for now.

Hed

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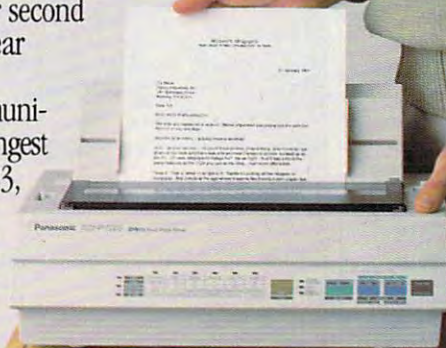
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ROBERT BIXBY
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Turbo Pascal 6.0 84

TOM CAMPBELL
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DENNY ATKIN
Ever wonder what the people on the chat lines are talking about? You may have tried to follow the conversation but found it's filled with strange terms and indecipherable acronyms. Here's how to learn the lingo: chat-line shorthand and jargon.

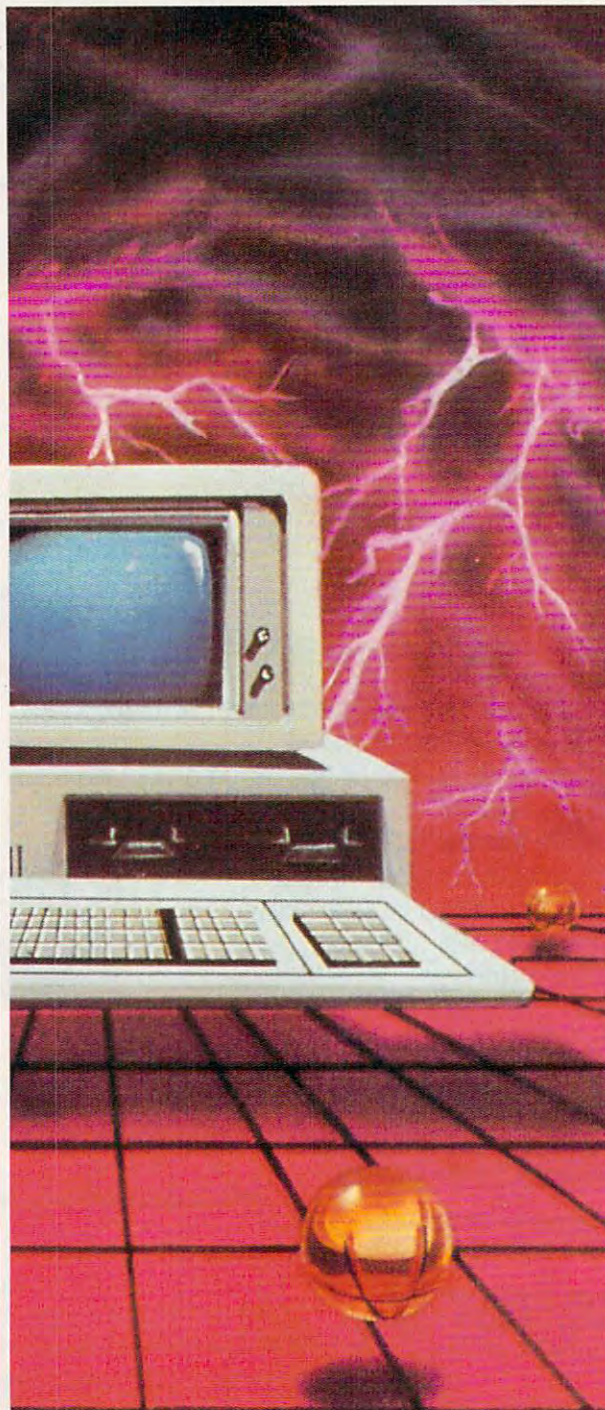
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Postal rates skyrocket. Letters take days. Electronic mail, or E-mail, can keep you in contact 24 hours a day, seven days a week. You can maintain business relationships, develop leads, and improve your productivity with round-the-clock communications.



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The world has opened up for ten-year-old Dustin Webb. Now, well-integrated hardware and software ensembles allow thousands of disabled people just like him to speak, write, and communicate as never before.

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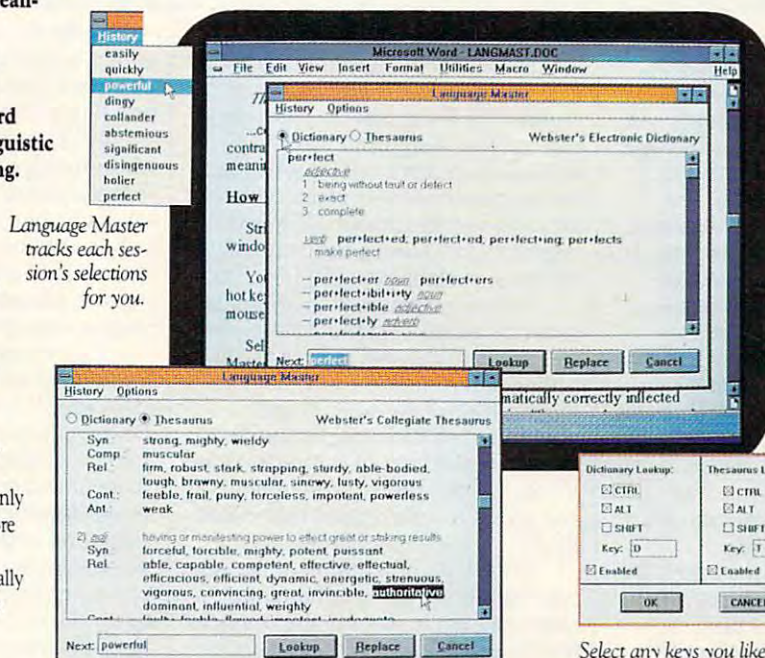
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P E T E R S C I S C O

If you're among the many computer users who've been bombarded by the latest technological buzzword, *multimedia*, your understanding of that term may revolve around a vague and tenuous idea of television pictures, stereo music, and a PC. But multimedia isn't a new phenomenon sponsored by advanced technology. It has its roots in various intellectual movements—from art to philosophy—that span the last 20 years.

As an art form, multimedia gathers disparate images into a single, focused vision—not as a sluice channels water, but as a laser channels light. It's particularly fitted to this postmodern world of visual impressions, fragmented narratives, information overload, and accelerated living.

Multimedia isn't just a collection of computers and programs coupled with camcorders and CD players. Computer hardware and software makers have seized on multimedia as a means of packaging products for consumers. (And that's not a criticism; it's a fact. Turn on MTV if you want to see the standards under which

software—in this case, music—is packaged for your consumption.)

The most vocal proponents of multimedia insist that the hardware and software born from this latest technological wave will integrate computing into suites of mutually enhancing applications with an unlimited capability for creating new ways of teaching, working, and playing.

But using that word *multimedia* to define a class of computer activities and applications underscores a compelling, if rarely stated, axiom about the PC: It's not the amount and availability of information that defines the usefulness of computer technology; rather, it's the presentation of and access to information that makes the PC such a powerful medium.

Most folks don't think of the personal computer as a medium in its own right, not in the way they think of television, for example. McLuhan's oft-quoted line of the medium as message didn't originally apply to the PC—or did it? And if the answer to that question is *Yes*, then exactly what kind of medium is it?

Is the PC an expansive, open-ended, technologically sophisticated channel to the world—past, present, and future? Or is it limited by its complexity? Does the PC's graphical and oh-so-modern attractiveness to the video generation make it the equal of television and film? Or is the PC's access to and manipulation of information held prisoner by its reliance on such paraphernalia as keyboards, display terminals, and floppy disks?

Can the personal computer create a society of aware citizens, with instant access to necessary information? Or does PC technology spew noise into the channel, obscuring critical thought and debate? Can the PC bring people together as a community of insights and ideas? Or will the PC landscape remain the elite domain of the computer-literate? And, the ultimate query: Does the shape of PC technology influence our view of the world?

We often limit the PC's influence by calling it a *productivity tool*, a *learning environment*, or a *game machine*. These phrases fail to consider the personal computer's greatest attribute—that it can enhance, educate, and entertain, all from within the confines of its metal casing.

You hear a lot of talk about how multimedia is the next great wave of personal computing. You also hear a lot of talk about how multimedia is just another buzzword that hypes purposeless technology at the expense of purposeful engineering. Well, here's another earful. Multimedia isn't a product. Multimedia isn't hardware or software you can buy. It isn't TV pictures and stereo music on your computer. It's the essential interplay of multiple perspectives necessary for critical thinking and creative solutions.

The writer Walker Percy launched speculations by “sidling up alongside” ideas through language and the power of metaphor. If multimedia can separate PC use from the encumbrances of technology, then we have gained a valuable perspective on the roles computers play in our lives. □



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NEWS & NOTES

We're Just Good Friends

The computer press is sometimes so filled with rumors that it approaches the standards set by the likes of grocery store tabloids. Microsoft has stepped forward to deny one such rumor—that the company would soon drop OS/2, the advanced multitasking software environment currently being sold for use on high-end IBM PC-compatible personal computers.

The company said that Microsoft and IBM are continuing the joint development of OS/2. According to Microsoft, the company will continue to service, support, and sell OS/2, and will also continue to develop OS/2 applications, adding to the 11 OS/2 applications currently available. Meanwhile, rumors also abound that *Microsoft Windows*, another icon-based multitasking environment, has become so powerful and flexible that customers are feeling little need for OS/2. It could be that one of Microsoft's own products will kill OS/2 without Microsoft's having to pull the plug itself.

Bye-Bye, Black-and-White

If colorized versions of classic black-and-white movies irritate you, you're going to be a lot more irritated in years to come. A patent has just been issued to American Film Technologies for a new film-coloring technology the company claims is the only all-digital computer system for converting black-and-white films to color.

With the new technology, color assignments come from digitally selected colored picture elements and actually replace individual black-and-white images. The result, says American Film Technologies chairman George R. Jensen Jr., is a pure color image that is consistent from frame to frame.

IBM Serves Up a Tennis Information System

Tennis fans attending the IBM/Association of Tennis Professionals (IBM/ATP) Tour can just touch a PC screen and receive a wealth of data that can make watching the matches more interesting. IBM's PlayerFacts system, housed in kiosks positioned to be easily seen by arriving fans, is based on IBM Personal System/2 computers with touchscreens. Fans touch one of three screen icons to receive player biographies, learn how specific players have fared against one another, and obtain a list of past winners of the tournament currently being played. Another PS/2-based radar gun system is measuring the speed of each serve and displaying the results for fans on a large electronic scoreboard in the court area.

In the future, the PlayerFacts system will use information from the new IBM/ATP Tour MatchFacts global information system, in use for the first time this year. MatchFacts is the game's first historical, in-depth record of men's singles play. It tracks ten categories of statistics from 3000 matches played annually by 700 ranked players at 77 tournaments worldwide. IBM is the title sponsor of the ATP Tour.

Too Hot to Handle

A CD-ROM database of names, addresses, and marketing information on 120 million U.S. consumers has been deemed too hot to handle and canceled by its creators. Lotus Development and Equifax canceled shipment of *Lotus MarketPlace: Households* after an assessment of public concerns about the product determined public sentiment was too negative to overcome.

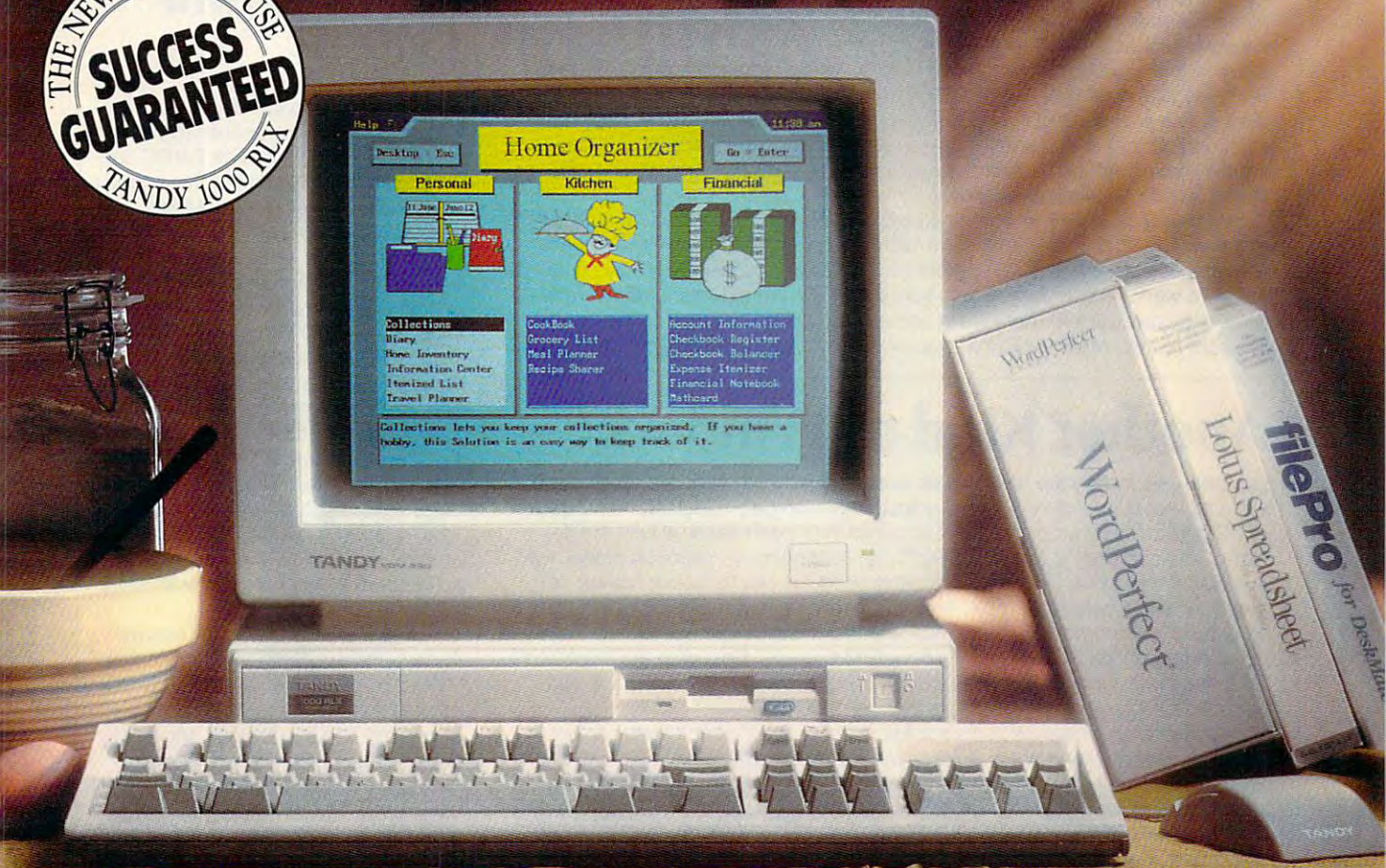
News of *Lotus MarketPlace: Households*, which was due to ship in March, led to what both companies described as "a firestorm of public concern about consumer privacy." Lotus and Equifax claimed the actual data content and controls built into the product ensured consumer privacy but decided the expense involved in educating the public to that fact would be too great. Lotus also announced that the company will discontinue shipment of *Lotus MarketPlace: Business*, a database of information on 7 million U.S. businesses that began shipping in October 1990.

If It Were Up to Me

If you've ever felt world events are totally out of your control, give *SimEarth—The Living Planet* a spin and feel better. *SimEarth* lets you control an entire planet, including the development of intelligence, civilization, and interplanetary travel. If you're not too happy with earth to begin with, you can create your own planet from scratch or use one of six other prebuilt planets. You can explore the game with no set goal or pursue specific goals, such as developing a civilization of intelligent dinosaurs or a greenhouse world to see which species survive. In either case, *SimEarth* could spell relief to anyone who'd like to feel in control, even if just for a little while. It retails for \$69.95. For information contact Brøderbund Software, 17 Paul Drive, San Rafael, California 94913.

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NEWS & NOTES

Toward a Longer Life

The computer industry is hard at work extending the life of laptop batteries. While this endeavor is certainly not as earth-shattering as, say, medical science's efforts to extend the human lifespan, its ramifications are mighty important to the growing masses of laptop and notebook PC users around the world. Phoenix Technologies' new PhoenixMISER series of power management software systems is one such development raising a lot of hopes. This is software designed to extend battery life for small PCs, ranging from high-performance, ni-cad battery-based 386 and 486 laptops and notebooks to PC-compatible palmtops based on two AA alkaline batteries.

PhoenixMISER, when combined with PhoenixBIOS, enables manufacturers to design fully functional, small form-factor PCs that not only minimize power consumption but are also 100-percent compatible with desktop PC systems. The software works in conjunction with specific power-management hardware features and can double battery life in some computers. For more details contact Phoenix Technologies, 846 University Avenue, Norwood, Massachusetts 02062.

Another Kind of Window

Laptops—especially the new smaller notebook-sized models—are selling so well that recent published reports indicate that Compaq, a leading manufacturer of PC-compatible laptop and desktop computers, can't keep up with the demand. The company's new LTE 386/20, an 80386-based notebook model, was due sometime during October 1990. Shipments are still far below market demand. Analysts believe Compaq's dominance in the notebook PC market could be seriously jeopardized if the company doesn't start shipping the new high-powered notebook PC in quantity soon. IBM and AST Research are ready to release their own comparable notebook PCs that will sell at a lower price, and Compaq's window of opportunity is closing rapidly.

Compaq's dominance in the market might erode if it can't keep up. But industry analysts Hambrecht & Quist say there should still be plenty of sales to go around. A recent report, "Portable Computing and Its Enabling Technologies," states that annual unit growth of notebook computers could exceed 50 percent through 1994. The report notes that users are beginning to demand portable computers that are smaller and lighter, yet faster and more powerful, and predicts that the notebook segment will provide the "most exciting market opportunities" in the PC industry throughout the first half of this decade.

Tandy's Newest Notebook

Tandy, often credited with creating the notebook PC genre, is now shipping a notebook-sized IBM PC-compatible that features a 16-MHz 80C286 micro-processor, VGA graphics, an internal hard disk and a floppy drive, and a battery life of up to 3.5 hours. The new Tandy 2810 HD comes standard with 1MB of RAM (expandable to 5MB). An optional Intel 287 XLT math coprocessor can also be added. The MS-DOS 4.01 operating system, Tandy's new *DeskMate* 3.5 personal productivity software, and the TEMM memory manager are factory-installed on the hard disk, and the new notebook comes equipped with an eight-ounce AC adapter/charger capable of recharging the replaceable ni-cad battery in just two hours.

The new Tandy notebook is designed to double as a desktop PC, with built-in ports for an external 101-key enhanced keyboard, an external VGA monitor, and a variety of additional peripherals. It also comes equipped with an internal slot for an optional 2400 bps modem (\$199). The suggested retail price is \$2,499. It's a far cry from the simple word processing and limited BASIC capabilities we saw in that earliest of all Tandy notebook PCs, the Tandy 100. For more information, contact Tandy, 1800 One Tandy Center, Fort Worth, Texas 76102.

Sidekick 2.0: Smaller and Better

Borland International has just proven that good things come in small packages by shipping *Sidekick* 2.0 PC software. The latest version of this popular personal and business organizer package is actually smaller than the previous version, but it packs more of a punch than ever before. A windowed user interface ties *Sidekick*'s five applications—*Time Planner*, *Address Book*, *Communications*, *Notepad*, and *Calculator*—into one integrated Terminate and Stay Resident (TSR) system. Requiring only 40K of RAM, it's also the perfect system for today's mobile office environment filled with palmtop organizers, laptops, and notebook PCs, offering a special reconciliation feature that automatically eliminates schedule conflicts for users with more than one computer.

The *Time Planner* maintains calendars and appointments that can be viewed by day, week, month, or time committed. A prioritized to-do list allows users to set warnings and due dates. Uncompleted tasks automatically carry forward to the next day until completed. The *Address Book* maintains names, addresses, and phone numbers in an easy-to-use rotary card format. It has a speed-dial feature for frequently called phone numbers. The *Communications* application is used for data calls to online services and uses the same formats and speed-dial feature as the *Address Book*. The *Notepad* is designed for writing quick memos or notations that can be attached to appointments, to-do items, or address book entries to provide supplemental information. It features adjustable margins and tabs, automatic word-wrap, spelling checker, and thesaurus.

Sidekick 2.0 supports leading local area networks (LANs), such as Novell, 3COM, IBM Token Ring/Extended Edition, Banyan, and other networks that are 100-percent compatible with DOS 3.1 or later. The suggested retail price is \$99.95. Contact Borland International, 1700 Green Hills Road, Scotts Valley, California 95066.



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Garry Ray, writing for PC Week, said, “Of these alternative operating environments (OS/2, DesqView and Software Carousel), Carousel may be the best choice of the day.”

Barry Simon of PC Magazine concurred with, “...I find it difficult to imagine using my computer without Carousel. This package has become an essential tool and one that I strongly recommend.”

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NEWS & NOTES

Improve Your Memory

Every computer user's experienced it. You work hours on a special report or other task, and suddenly, the power goes out. Everything you've done after your last save to disk is lost. Fortunately, this scenario could change, thanks to a new nonvolatile Dynamic Random Access Memory (DRAM).

DRAMs are the most widely used type of semiconductor memory device in the world. Until now, they've all required a constant supply of power in order to maintain their memory. Ramtron's new nonvolatile DRAM is the world's first that's capable of actually retaining information without power. It's a ferroelectric DRAM that consolidates the functions performed by multiple forms of RAM and ROM into a single memory component.

The new chip operates in two modes. During normal operation, the ferroelectric storage cells hold data in the form of electrical charges identical to conventional DRAMs. When power fails or is otherwise removed, the ferroelectric storage cells are polarized to save data indefinitely without power. The company claims its new DRAMs set the stage for a fundamental change in the way computer systems are designed. For more information, contact Ramtron International, 1850 Ramtron Drive, Colorado Springs, Colorado 80921.

A Standard Standard?

Techbyte International's new Software Portability Environment could become a computer standard that defines all other computer standards. Lack of software portability has long been a problem in the computer industry because most computers won't run software written for other computers. The Software Portability Environment is designed to end all that.

Techbyte International demonstrated its new system by using it to run the same software package on an Apple Macintosh LC and an IBM-compatible computer. The new system will, for example, allow educational software developers to produce applications software for multiple computer platforms with only one development effort.

The Software Portability Environment will be marketed under the name *VSE System*. For more information, contact Techbyte International, 4025 Woodland Park Boulevard, Suite 380, Arlington, Texas 76013.

The Fine Art of Computing

The computing world and the art world have come together to offer art collectors of all kinds the opportunity to examine the development, cultural implications, and financial activity of over 1000 different art forms with a higher level of scholarship. ArtFact has unveiled a new CD-ROM-based database called *ArtFact* that compiles information from worldwide art auction house results, providing a database for unearthing patterns in a particular object's aesthetic development.

Company founder and president Stephen Abt said, "We set out to create a tool which could support a fundamental advancement in the way users learn and think about art." Abt sees a healthy market for the service among art and antique dealers and collectors, museums, libraries, news agencies, personal property appraisers, insurance companies, and estate planners. An annual subscription will cost \$4,500, with each additional year costing about half that much. Abt said, "The price may strike people as being a bit high, but buying all the current auction catalogs and reference materials from which the data is compiled would easily cost \$70,000 or more." Contact ArtFact, 1130 Ten Rod Road, North Kingstown, Rhode Island 02852.

Making His Own Record

Borland International customers and friends got an eyeopener (actually an ear opener) of a Christmas gift last year. As part of a special holiday promotion, Borland distributed several thousand copies of a jazz compact disc as a holiday gift. It wasn't just any jazz CD, either. Titled *Pacific High*, the CD featured Borland chief executive officer Philippe Kahn and a number of noted jazz artists, including John Abercrombie, Alex Acuna, Richie Beirach, Paul Contos, David Eshelman, Billy Hart, Ray Kane, Dave Liebman, and Ron McClure. On the CD, Kahn plays tenor saxophone and flute.

"Proceeds from any sales of the CD would go to benefit AIDS research," said Kahn. "However, there's an important corporate message in using this CD. *Pacific High* musically applauds the innovations in technology that were developed in the Silicon Valley and Pacific Rim. We are saluting, through a combination of jazz and rap pieces, the powerful contributions the developers of the personal computer have made to global communications."

High-Tech Mice

Logitech, one of the world's leading producers of computer mice, says it's time for a change. The company is just shipping a new family of computer mice that incorporates what it refers to as an uncommon level of attention to ergonomics.

For the first time, the company says, computer users will be offered new options based on their individual physical needs. By providing a range of choices, the company expects to recast current retail marketing for PC peripheral products.

"News & Notes" is by Alan R. Bechtold, editor of *Info-Mat Magazine*, an electronic news weekly published by BBS Press Service.

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Back Up Batman!

I would like to know how to make backup copies of games like *Batman*, *Contra*, and *Arkanoid II*. Also, could you give me the address of Computer Business Solutions?

TRAVIS MAY
 BROOKDALE, MB, CANADA

Publishers of computer games generally don't like to have users make copies of their disks—even for backup. The DOS DISKCOPY command might work, but most game publishers employ copy protection that prevents making a working copy (though all of the files might appear to be copied). Even that nonworking copy would be illegal, however, so we advise you not to try. If you accidentally ruin your original disk, most companies will replace it for a nominal fee.

In answer to your second question, Computer Business Services is located at 508 East 6th Street, CBC Plaza, Sheridan, Indiana 46069.

Exhuming Decrypt

Kirk Leslie of Enoree, South Carolina, wrote to "Feedback" a few months ago looking for a program called RCRYPT. RCRYPT.COM was on the MS-DOS 3.30.20 supplemental disk that came with my Tandy 1000SL. The syntax is RCRYPT *pathname1* [*pathname2*]. If you enter *pathname2*, the encrypted file will be written to disk. Otherwise, the file will be sent to the screen. When you enter the command, you will be prompted for a 0-8 character encryption key.

JOHN C. SLOAN
 DUBUQUE, IA

Child's Play

I've read with great interest the articles in COMPUTE on children's games and educational software. Two of the leading companies appear to be Broderbund and The Learning Company. Is their software available in the United Kingdom? If so, could you please let me have an address of a supplier?

If these programs aren't available in the U.K., perhaps you could list the

address of these companies so that I can contact them directly.

BRIAN MOODY
 BUNGOMA, KENYA

Broderbund's distributor in England is called Broderbund England. To place an order, call 01-780-2222. Its United States customer service number is (800) 521-6263.

The Learning Company doesn't have a distributor in the U.K., but you can call its toll-free number, (800) 852-2255, or write 6493 Kaiser Drive, Fremont, California 94555, to place an order.

Dynamic Context

Could you clarify the difference between context switching, dynamic memory management, and multitasking?

HSIN TU
 N. HOLLYWOOD, CA

Context switching, dynamic memory management, and multitasking are all methods for expanding the power of your PC. Programs that context-switch allow you to switch freely among (sometimes) dozens of programs.

When you switch from one program to another, the memory used by the exiting program is saved to disk, and the location of the information about that program is stored by the context switcher. Then the entering program is brought into memory. When you switch back, the second program and all the memory it has used are saved to disk, and the first program is loaded from disk. The program being brought into memory appears not to miss a beat, but in fact, it has been dormant all the time it was stored on disk.

Multitasking involves having more than one program running at the same time. Generally, this means that all the running programs have to be in memory simultaneously, but thanks to new technology called dynamic memory management, this is no longer necessary with some machines. Computers with 80386 and 80486 CPUs can treat hard disk space as if it were memory, swapping out parts of pro-

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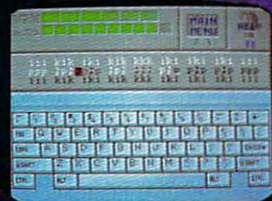


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FEEDBACK

grams that are momentarily inactive so that more programs can be managed in RAM. The system works well in theory, but it requires a lightning-fast hard drive, and even with the fastest equipment, OS/2 (the operating system that makes use of dynamic memory management) has shown itself to be disappointingly slow.

Generally, multitasking is accomplished by assigning a certain period of CPU access time to each of the running programs. Windows and OS/2 take the strategy of assigning a set amount of time to each running program, even if one of the programs is idling. This results in a loss of access to programs that really need CPU time. GEOS, according to GeoWorks, allots time according to each program's need. Supposedly, this results in more efficient operation. However, try this with Windows and GeoWorks Ensemble: Start up the word processor, write a few lines, send what you've written to the print spooler, close the word processor, and immediately start playing solitaire. Whereas Windows will spool the document to the printer in a few seconds, you will have a long wait before the document is printed in GeoWorks Ensemble. To be fair, GEOS is new and probably has a few problems to iron out.

Mirror, Mirror

In order to get a certain graphic character of the IBM 255-character set, I can hold down the Alt key and enter a number on the numeric keypad. Is there a way to tell the computer to switch the character set so that when I press the A key, for example, I can get the smiling face?

Also, I'd like to write a routine that enters text backward as it's typed in, so that when you type the word *secret*, it appears on the screen *terces*.

FRANCIS BARRETT
NEWTON, NC

Older computers like the Commodore 64 allowed you to copy the character set from ROM to RAM and modify it, but the PC's not as flexible. You can redefine the upper 128 characters by setting a pointer to a new table of definitions. That won't work on a mono or Hercules system. The first 128 characters can't be redefined on any system. Here's a simple BASIC routine that will make the translation you want within a program:

```
OS = "AaBbCc"
NS = CHR$(1) + CHR$(2) +
CHR$(3)
GetText:
A$=INKEY$
IF A$ = " " THEN GOTO GetText
FOR I = 1 TO LEN(OS)
IF A$ = MID$(OS,I,1) THEN A$ =
MID$(NS, INT((I + 1)/2),1)
NEXT
PRINT A$;
GOTO GetText
```

Within word processors, you might be able to write a series of macros that have the same effect. Unfortunately, there is no way to make this work at the command line.

Here is a brief routine that accepts text input, then places it on the screen in reverse:

```
CLS
GetText:
A$ = INKEY$
IF A$ = CHR$(13) THEN GOTO
Finish
IF A$ = " " THEN GOTO GetText
B$ = B$ + A$
C$ = A$ + C$
LOCATE 10, 20: PRINT C$
GOTO GetText
Finish:
```

Note that C\$ contains the input in reverse and B\$ contains the input in its proper order as typed.

The Keys to Speed?

Where can I find a keyboard with a faster alternative layout, such as Dvorak or Maltron, for my computer? Also, once I do find such a keyboard, where do I get an operating system to fit it?

STEPHEN WALLACE
TORONTO, ON, CANADA

As your letter suggests, the QWERTY keyboard, with which we are all familiar, was not built for speed. Despite increasingly sophisticated typewriters, and now computers, the keyboard layout we use remains the same.

In the 1930s August Dvorak, a cousin of composer Antonin Dvorak, developed a more efficient layout in which the right hand and the left do equal work, the strongest fingers do the most work, and a majority of the typing takes place on the home row.

Despite this improvement and the

more recently developed Maltron alternative, the world isn't ready to unlearn QWERTY and try something new.

Fortunately, though, computers make it possible for individuals to make the switch if they choose. You don't need a new keyboard, and you don't need a new operating system. All you need is software that remaps your keyboard.

Borland's SuperKey, a keyboard macro program, provides a facility for creating and developing alternative keyboard layouts. The package even includes a Dvorak layout that's ready to load and use.

If your physical keyboard has key caps that pop off, you can rearrange the keyboard; otherwise, use stickers of some sort to relabel the keys while you're learning the new positions. Just be sure the stickers don't come loose and slip between the keys, gumming up the works.

If you can successfully learn the new layout, you'll be the fastest typist on the block, but we wonder whether speed should be the overriding issue.

A lot of computer work these days involves editing and manipulating data rather than simply entering data en masse. Much of today's computer work requires careful consideration—something that's not possible at 200 words per minute.

Redrawn Plans

Richard Overby's letter in the March 1991 *COMPUTE* asked for the name of software that could be used to create floor plans. One option he could explore is *Dream House Professional* from Editor's Choice Software, P.O. Box 9096, Seattle, Washington 98109; (800) 641-1116. It costs \$79.95 plus \$4.95 for shipping. The order numbers are #DHP21-5 for 5¼-inch disks and #DHP21-3 for 3½-inch disks.

THOMAS L. ACKERMAN
OAKLAND, CA

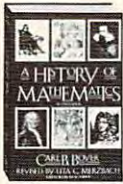
Cutting Off the Hackers

We have stand-alone PCs in our college computer lab. Students often steal the programs and change the AU-TOEXEC.BAT file. Is there any way we can protect our hard disk?

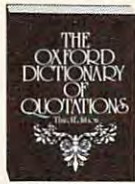
JAGPAL S. TIWANA
TRURO, NS, CANADA

Protecting files on shared PCs is a difficult problem, and in many cases the

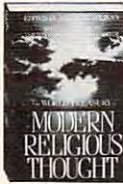
With QPB, There Are No Hidden Costs Or Commitments.



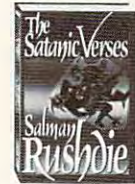
100. This revised 1968 classic offers an overview of mathematics and mathematicians.
QPB: \$19.95



*482. This latest edition of the famous dictionary has 40,000 memorable quotations.
 Hardcover: \$45
QPB: \$18.95



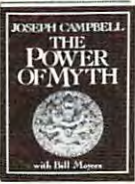
*128. A fascinating collection of modern religious, contemplative and inspirational writing.
 Hardcover: \$29.95
QPB: \$14.95



*406. "A roller-coaster ride over a vast landscape of the imagination" —London Guardian.
 Hardcover: \$19.95
QPB: \$9.95



617. The newest novel by this critically acclaimed writer is charged with sexual and racial tension.
 Hardcover: \$19.95
QPB: \$8.95



423. A scholar on mythology tells how myths have shaped our lives. A PBS TV series.
 Hardcover: \$27.50
QPB: \$15.95



223. Imagine Leonardo da Vinci using puppies for paintbrushes and you've got Larson's new Far Side book.
QPB: \$6.95



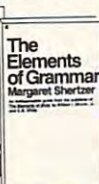
*248. New 1991 edition. What to write, how to write it and where to sell it.
 Hardcover: \$28.95
QPB: \$13.95



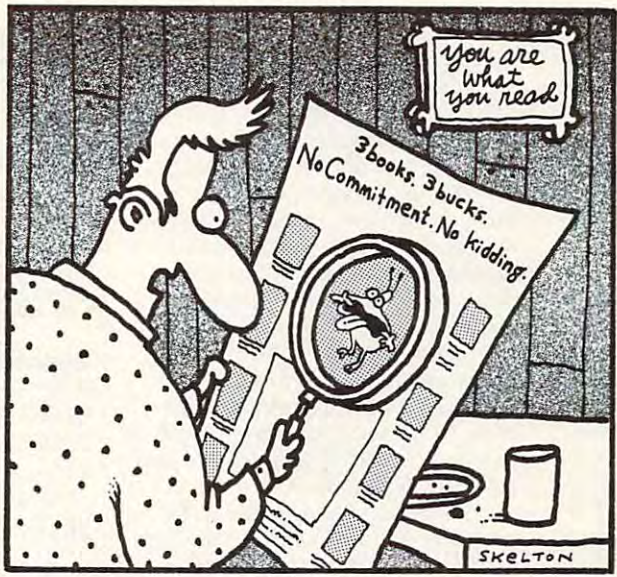
267. The story of civilization in a unique chart format.
 Hardcover: \$29.95
QPB: \$15.95



109. The Elements of Style discusses what good writing is; The Elements of Grammar gives the rules to follow; The Elements of Editing describes what's said best—and what's best left unsaid.
 (3-volume set)
QPB: \$10.95



288. Let The Simpsons™ help you express yourself with their hilarious, full-color postcards.
QPB: \$6.95



Harold looked for the small print but couldn't find any. Though he did discover a new strain of bacteria.

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So join QPB today. And you'll discover a wide range of great books—and not one bit of small print.



*120. A history of oil, from the drilling of the first well to the Iraqi invasion of Kuwait.
 Hardcover: \$24.95
QPB: \$12.95



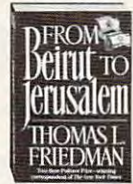
*417. The ultimate one-volume collection of the world's most-sought-after information.
 Hardcover: \$34.95
QPB: \$16.95



*127. A dazzling study that examines endeavors common to all forms of animal life.
 Hardcover: \$35
QPB: \$14.95



210. Three horrifying novels by J.G. Ballard: *Concrete Island*, *Crash* and *The Crystal World*. (3-in-1 vol.)
QPB: \$11.95



315. The National Book Award winner brings to life the Middle Eastern world.
 Hardcover: \$22.95
QPB: \$10.95



*137. The "OED of slang" is filled with fun and educational facts about 20th-century slang words and phrases.
 Hardcover: \$35
QPB: \$16.95



321. Stephen Hawking offers a convincing big picture of the origins of the cosmos.
 Hardcover: \$18.95
QPB: \$8.95



310. A new cookbook from the legendary restaurant, featuring superb vegetarian cookery.
QPB: \$15.95

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FEEDBACK

cure is worse than the disease. A password system might allow you to prevent students from copying or removing files, but administering the password system might take more time than it's worth.

Digital Research's DR DOS, an outstanding replacement operating system for MS-DOS, has a password feature with a variety of options that might prove useful. In addition, DR DOS offers excellent memory-management features and several extensions to MS-DOS, while remaining fully compatible with the traditional operating system.

With such a system, you should be able to password-protect AUTOEXEC.BAT so no one could change it, but an enterprising or mischievous student could boot the system from a floppy and, using commonly available utilities, locate the protected file and modify it.

You could try to outsmart those bent on vandalism by tossing them a red herring. This involves modifying the COMMAND.COM file on your hard disk. Before you begin, make a backup copy of COMMAND.COM and have a bootable floppy disk available in case something goes awry.

What you'll do is edit COMMAND.COM so it loads another file rather than AUTOEXEC.BAT on startup. Put your startup instructions in that file, and the system simply ignores AUTOEXEC.BAT.

Using a disk-editor program, such as The Norton Utility, load COMMAND.COM and search for the characters AUTOEXEC.BAT. Using the editor, change these characters to the name of your substitute startup file. You should use the same number of characters, but you can use an extension other than BAT, if you like.

Write the changes to disk. Then using an enhanced ATTRIB program, make your substitute startup file invisible by setting its hidden attribute. You'll need a third-party ATTRIB utility because the standard MS-DOS ATTRIB command only permits changes to the archive and read-only attributes.

If you ever need to change the startup file, remember to unhide it first so your editor can access it.

Now you're set; the system boots from the invisible file. Changes made to the old AUTOEXEC.BAT, which is left hanging around the root directory,

will have absolutely no effect.

It sounds like it might work, but it won't take long before your inquisitive, enterprising students smell a rat and figure out the solution to this puzzle.

If your computers were on a network, the network software would provide some level of security, but with stand-alone systems, you're really at the mercy of your users. Maybe the best solution is to give them some responsibility for the well-being of the computers and to give them some space and time to explore and play, along with a solid training program on the consequences of software theft and copyright violations.

For some of your students, the computer is just a tool that helps them complete a job. For a few others, though, and for many of our readers, the computer is a never-ending challenge, an ever-changing puzzle, and a door to uncounted hours of exploration and experimentation.

More Reviews

I've been a COMPUTE subscriber for several years, and I've noticed that there are now fewer MS-DOS-specific reviews. It would be greatly appreciated if you would increase the attention you give to MS-DOS products. Other than that, COMPUTE continues to be one of the most informative and objective computer magazines on the market.

GINO FRABONI
COBALT, ON, CANADA

You will be glad to hear that we at COMPUTE recognize the expanding role of the PC in the home business, education, and entertainment markets and have responded with increased coverage of MS-DOS hardware and software in features, columns, and reviews. Two examples of this are our new Tech Support section, which offers technical advice on PC hardware and software, and our new Test Lab, which features in-depth reviews of the latest PC hardware.

Enabling Technology

I am writing in response to an article titled "Building Bridges" by Howard Millman (COMPUTE!, February 1990). This article made some very good points about the technology used to help the handicapped.

I agree with the author that the

government doesn't see programs for the handicapped as glamorous. I feel that this is because there isn't enough publicity for these programs. If there were more advertising for programs to help the disabled, the public would realize how much these programs are needed and would urge government officials to provide more of them.

ANDRAE SINGH
S. OZONE, NY

Slipped Disk

When I purchase a program that contains only a 5¼-inch disk, I don't think it's fair for companies to charge a \$5 to \$10 handling fee to provide a 3½-inch version.

MRS. IRA CRIPPS
WHITMAN, MA

It may sound ridiculous, but the special handling necessary to replace disks may actually cost a company \$5 to \$10. The other alternative would be to ship both disk sizes in the same package. This is the best solution for the consumer, but software companies may worry that it encourages piracy. One company included 5¼-inch and 3½-inch disks in the same package and then required that the unused disks be returned with the registration card. There is probably no perfect solution to the problem, but your point is well taken: It's a tremendous inconvenience to swap disks with the manufacturer. Talk to your retailer about stocking both versions. He or she might be willing to special-order 3½-inch versions of software for you.

System Sleuth's Number

In "Is There a Doctor in the House?" (April 1991), the telephone number for Dariana Technology, publishers of System Sleuth, is incorrect. The correct number is (714) 994-7400. We apologize for any inconvenience this may have caused.

Readers whose letters appear in "Feedback" will receive a free COMPUTE's PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to COMPUTE's PC Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. □

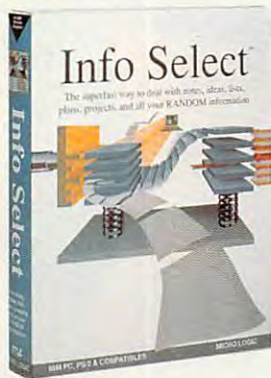
How this \$149 software will:

- 1) Improve the way you work and think,
- 2) Instantly find the info you need, and
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The next generation
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"the most useful software
program I have ever owned."
Steve Gibson, InfoWorld

Surprisingly, there is a whole new world of uses for your computer! You can use your computer to deal with all the countless bits of "random" information scattered across your desk: plans, notes, lists, actions, contacts, ideas,



Are you forgetful?

Were you born with a memory situated squarely on the tip of your tongue? Do you forget things like which day you placed an order or important numbers? If you are forgetful you especially need INFO SELECT - the software that remembers almost everything for you.

Thinking tool

Have you ever worked on a complex project and felt lost? With INFO SELECT you'll group, scan, and cross search through all your notes so fast you'll see the big picture in seconds.

Will I be better off doing this now or that later? Keeping priorities straight can make or break your career or your business. INFO SELECT lets you keep on top of what's hot.

Should you use an east or west coast supplier? To make decisions you need facts. Now you can view the facts any way you like ... as fast as you can think. You'll make the best decisions ever -- and fewer expensive mistakes.



Phone notes



Client info



Decisions



Management

The #1 PIM

What's all the fuss about PIMs (Personal Information Managers)?

Simple - you probably have more RANDOM information than any other type and you need a PIM to properly handle this kind of information. The right PIM will save you time and make everything you do go smoothly.

Why is Info Select the #1 PIM? Because Info Select is based on ideas you can identify with - like stacks of paper. And it's free-form too. You

won't waste days or weeks learning complex structures. Instead you'll be up and running in minutes. Info Select also does more and costs less than other PIMs.



Owners of our TORNADO software (symbolized by the famous "blue tornado") can trade up to the second-generation Info Select under our special offer. There are over 200 improvements.

Feature packed

INFO SELECT is memory resident (if you choose), so you can quickly jump in from other programs. Info Select windows can hold: notes, plans, lists, facts, letters, contacts, and much more. You can search for a window or a group of windows related by a word or phrase. There are five ways to see overviews: hypertext, a fast sort, and line drawing. Save time with the dialer, date tickler; and searching by text or date ranges.



If you have notes, ideas, contacts or other unorganized RANDOM information, you need Info Select.

Info Select allows you to: add columns of numbers; store data in EMS; use template or free-form windows; import and export files, screens, and databases; move, join, and duplicate windows and much more.

LAN option

The new LAN version allows integrated E-mail, sharing company rolodexes and distributing company policies. You can share any kind of information. It's your first step into the exciting new world of groupware! Ask about the five node LAN starter pack.

Easy power

Info Select is easy to use yet offers the power you need with infobases up to 10 megabytes; text searches up to 700kb/sec; up to 32,000 characters per window; and up to 64,000 windows per infobase. Even better, Info Select can swap down to as little as 7K memory!

TORNADO owners

INFO SELECT is based on the pioneering TORNADO™ software PC World called "Excellent, Excellent, Excellent, Excellent" and PC Magazine awarded Editor's Choice - twice. Call about our special trade-up offer.

Endless uses

Info Select can do much more than manage all your RANDOM information. Use it to manage business correspondence, sales leads, orders, and client notes. Track facts, plan projects, or interrelate all your ideas. You can catalogue parts, documents, and inventory items. Match buyers and sellers or doctors and patients. Setup an information desk. Edit E-mail. Store notes on magazine articles, software operation techniques, or just names and addresses. Whether you are a lawyer tracking court cases or a zoologist collecting feeding habits you'll find countless uses for Info Select.



Info Select keeps your information in intelligent automatically positioned windows.

and much more. INFO SELECT™ will not only give you instant access to this important information ... it will help you make better decisions and see important new relationships. Try INFO SELECT risk-free and discover a whole new dimension of computing.

Photographic memory

INFO SELECT is like having a 'photographic memory' that gives you perfect superfast recall of up to 64,000 items of information.

Telephone notes

When Harry calls you on the phone, you'll display the six windows on Harry before he finishes his first sentence! No more embarrassing pauses or scrambling for information.



INFO SELECT is easy to use - yet powerful.

INFO SELECT also includes the world's first "3-D" word processor. You'll be amazed at how it works.

Instead of one window or ten, imagine up to 64,000! The uses are endless.

Risk-Free Guarantee

Info Select is so effective you will be amazed. That's why we offer our money-back guarantee. Try it for 30 days. If you are not fully satisfied, accept our full prompt refund. Could any offer be more fair?

All for just **\$149.95!** **New: Ver 2.0!**

INFO SELECT has a special price of just \$149.95. You can even try it risk-free with a 30-day money back guarantee. But hurry - this is a limited time offer.

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Jeffrey Parker,
PCM



"As easy as remembering your own name."
Patrick Marshall,
Info World



Editor's Choice
"First rate"
PC Magazine

MAIL ORDERS: Send name, address, phone number, and payment by check, Visa, or MC to address shown. Please include \$3.50 shipping (\$15 outside continental USA). **EUROPEAN CUSTOMERS:** Contact Atlantex U.S.A. (203) 655-6980. **TRADEMARKS:** Trademark (owner): Tornado, Info Select, Key Watch (Micro Logic), IBM PC, XT, AT, PS/2 (IBM). © 1990 Micro Logic Corp. U.S.A.


A stylized, glowing hand in shades of red and orange reaches out from the left side of the frame. The background is a vibrant, abstract digital space with a gradient from dark purple to bright yellow. Several glowing spheres in shades of blue, yellow, and orange are scattered throughout, some appearing to be part of a data stream or network. The overall aesthetic is futuristic and high-tech.

MAKE WAY FOR MULTIMEDIA!

DAVID ENGLISH

20 COMPUTE JUNE 1991

 www.commodore.ca



MOVE
OVER, MAC
AND AMIGA—
MULTIMEDIA HAS
COME TO THE PC

How would you like to have live video playing in a window on your PC screen? Or a high-fidelity voice speaking from your favorite program? Or 600 megabytes of information on a slender five-inch disc that can simultaneously play back text, graphics, video, animation, recorded sounds, and synthesized music? That's the promise of a powerful set of extensions to *Windows 3.0* to be released this year. ▶

To run *Multimedia Windows*, you'll need at least a 286 10-MHz system with VGA graphics, 2MB of RAM, a 30MB hard drive, and a 1.44MB 3½-inch floppy drive. You'll also need a CD-ROM player with a speedy 150K-per-second transfer rate and a sound card that can handle both multichannel MIDI data and 8-bit audio. The sound card will not only be able to play synthesized music and electronic sound effects, but also spoken voice, recorded music, and real-life sound effects.

Only a few of today's CD-ROM players are fast enough to meet the 150K requirement. These include models from Toshiba, Sony, and Hitachi—but more are on the way. The Sound Blaster from Creative Labs currently meets all the sound card requirements—with the exception of an on-board mixer (this lets your software control the various sound levels). Future versions of the Sound Blaster will include the mixer. Fully compliant sound cards from other companies are also in the works, including a new high-quality sound card from MediaVision.

Specially priced upgrade kits designed to bring present PC owners up to speed will be available from Headlands Technology, MediaVision, and Creative Labs. These kits will include a CD-ROM player, a sound card, and Microsoft's multimedia extensions to *Windows*. Expect these kits to retail for \$900–\$1,500.

To deliver complete multimedia hardware systems for new buyers,



Mixed-Up Mother Goose, from Sierra On-Line, demonstrates many features that will be standard with multimedia.

Microsoft has lined up some of the biggest names in the industry, including Tandy, NEC, AT & T, Zenith, CompuAdd, Olivetti, and Fujitsu. These companies sold over 25 percent of the PCs shipped in 1990 and represent a substantial commitment to a platform with no existing software. IBM will also support the new multimedia extensions through its OS/2.

Where's the Beef?

To drum up support for *Multimedia Windows*, Microsoft sponsored a two-day Multimedia Developers Conference last November. The goal was to convince software developers to create enough applications to make *Multimedia Windows* a success. One Microsoft representative went so far as to tell the developers they had the power to embarrass a lot of big companies: "If you want to make these companies look stupid, don't write any multimedia programs."

What will the new applications look like? At the conference, Microsoft gave developers a sneak preview of some of the programs that will be released at the same time as *Multimedia Windows*, including multimedia versions of Asymetrix's *ToolBook*, Authorware's *Authorware Professional*, Owl International's *Guide*, Aim-Tech's *IconAuthor*, Attica Cybermetrics' *MediaBase*, and Access Technology's *Windowcraft*. These are authoring programs that will allow nonprogrammers to create multimedia presentations and stand-alone multimedia programs. All these

programs support CD-ROM players and sampled sounds. Most of these programs also support MIDI synthesizers, full-motion video in a window, and playback of animation files.

Initially, there will be two ways to bring animation files over to *Windows*. MacroMind showed a program that plays *MacroMind Director* files on the PC (letting you bring complete multimedia files from the Macintosh over to *Windows*). Autodesk announced a similar program that plays *Autodesk Animator* files in *Windows*. Both programs can be linked to other *Windows* applications. For example, you could write a script in *ToolBook* that calls an animation file and runs it in a window in the upper left corner of the screen.

Microsoft showed two of its own multimedia programs, *WinDoc* and an unnamed talking-heads program. *WinDoc* is yet another multimedia authoring program, but one optimized

Opening Windows

Just when you figured out how to use *Windows 3.0*, here comes a new version with even more features. *Multimedia Windows* will include *Windows 3.0* plus the multimedia extensions to *Windows*. These extensions will add support for digital-waveform audio files (for realistic-sounding voice, music, and sound effects), MIDI music files (for synthesizer-based music and sound effects), Macintosh-based *MacroMind Director* multimedia files, various external devices (including CD-ROM and videodisc players), joysticks, and high-resolution 256-color VGA graphics.

A new Multimedia Control Panel will replace the current *Windows* Control Panel. Besides including all the previous functions, the Multimedia Control Panel will let you configure display drivers, external devices, joysticks, and MIDI settings. You'll also be able to choose from a series of screen savers and specify which audio files will play during system events and error messages.

(At the conference, Microsoft used the sound of a window opening as the *Windows* startup sound.) Developers can add their own drivers (called *applets*) to the Multimedia Control Panel for devices not yet supported by *Multimedia Windows*.

Microsoft will also include two new applications with *Multimedia Windows*: *Multimedia Clock* and *MPlayer*. *Multimedia Clock* is an alarm clock that can play audio files at a specified time and at hour, half-hour, and quarter-hour intervals. *MPlayer* is a simple multimedia player that can play a variety of multimedia files, including waveform audio, MIDI, animation, and CD audio.

To accommodate the new multimedia files, Microsoft is adding a new file format to *Windows*, called Resource Interchange File Format (RIFF). Strictly speaking, RIFF isn't a file format at all, but a family of formats that includes audio-file formats (WAVE, MIDI, and RMID), image-file formats (DIB, RDIB, WMF, and PAL), a multimedia-movie-

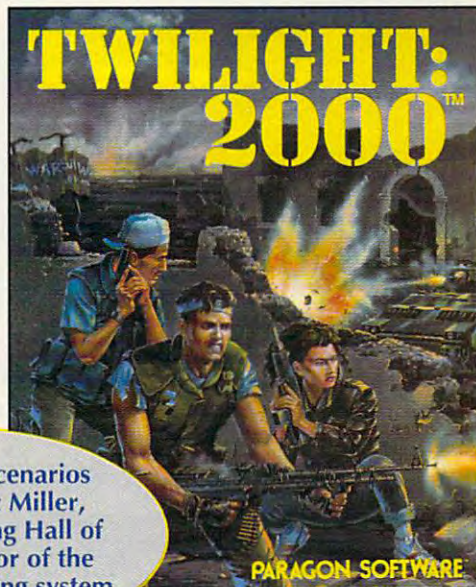
file format (MMM), and a text-file format (RTF). RIFF files contain a special header that describes the format of the data that makes up the rest of the file so the data will be handled appropriately.

While the minimum configuration for *Multimedia Windows* calls for a standard VGA card, Microsoft is encouraging developers to write applications for Super-VGA cards capable of displaying a resolution of 640 × 480 with 256 colors. For systems with a standard VGA card, Microsoft recommends that users switch to a 16-color gray-scale palette while keeping the 640 × 480 resolution. Most 256-color graphics hold up well when reduced to 16 shades of gray.

Look for *Multimedia Windows* to be released sometime in 1991 (it may even be available by the time you read this). According to Microsoft, *Windows* and *Multimedia Windows* will eventually be merged into a single package.

Take Control Of The Future

PARAGON SOFTWARE AND GDW PRESENT GAMES ON THE CUTTING EDGE OF TECHNOLOGY



Both featuring scenarios written by Marc Miller, Adventure Gaming Hall of Famer and creator of the Traveller role-playing system.

Twilight: 2000 places you in the aftermath of World War III, travelling through terrain devastated by high-tech weaponry and nuclear radiation.

- Create your character with the skills and abilities you want
- Command three other party members who respond to your orders based on *their* personalities and objectives
- State-of-the-art graphics include 3-D simulation and 2-D scaled overhead sequences
- Hundreds of weapons and vehicles make each encounter unique

Your mission: rebuild and defend the city of Krakow, Poland against an onslaught of marauders and military madmen determined to win a war the world lost.

Based on the role-playing classic from Game Designers' Workshop, **MegaTraveller 2: Quest For The Ancients** contains state-of-the-art innovations, including a completely re-designed, icon-driven interface, combat system and role-playing engine.

- The sequel to the hit MegaTraveller 1: The Zhodani Conspiracy with over 100 of named, detailed worlds to explore
- New PAL role-playing engine lets you control one character while commanding four others; advanced character generator guarantees variety with each game
- Weapons and starship classes of all kinds; a dazzling array of characters with whom to interact

Your mission: save a world threatened by a mysterious artifact built by the Ancients, a legendary super-race thought dead for 300,000 years.



IBM screens shown. Actual screens may vary.



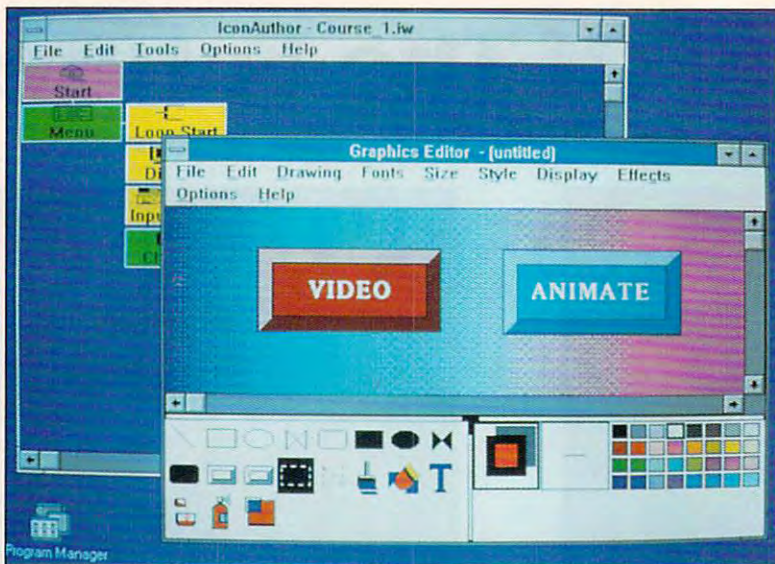
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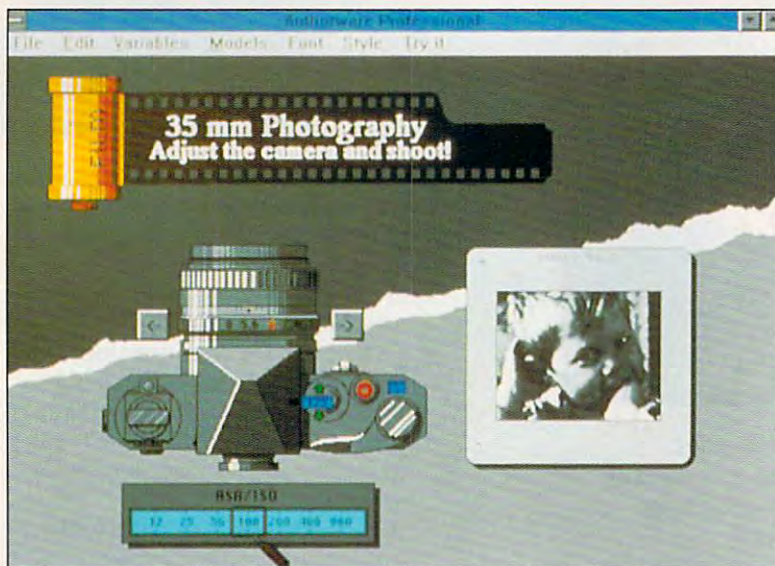
© 1991 Paragon Software and Game Designers' Workshop.

Circle Reader Service Number 110

www.commodore.ca



AimTech's *IconAuthor* allows nonprogrammers to create multimedia applications.



Authorware Professional lets you create multimedia applications without scripting.



Guide from OWL International comes with comprehensive linking tools.

for fast text searches on CD-ROM. It can also function as an index-and-search engine for other *Windows* programs.

The talking-heads program is still in early development. It was used in the opening presentation of the conference to show off the power of *Multimedia Windows*. This program can stream video directly off a CD-ROM disc with no flicker. In the opening presentation, a man's head appeared in a small window on the computer screen and spoke to the audience. Combined with animation and sound effects, it was truly an impressive sight.

I learned after the presentation that Microsoft had used a PS/1 (a 286 running at 10 MHz) and a Sound Blaster—the minimum required for a *Multimedia Windows* system—to perform the presentation. Eric Ledoux, technical lead for Multimedia Systems Tools at Microsoft, said that even at full screen on a 286 there would be very little flicker. While few individuals can afford the equipment to transfer their own full-motion videos to CD-ROM discs, this program does show the potential for software developers to include full-motion video in their CD-ROM products.

Will It Fly?

Will multimedia succeed on the PC? To answer this question, you have to break the potential audience into several groups. For internal use in corporations and other organizations, where money and standards are less of a problem, multimedia should do well almost immediately. Training presentations and in-store kiosks could use the new animation and sound capabilities to make dry information more entertaining. Corporations will also be attracted to the possibilities of voice-annotated mail. Companies that need CD-ROM discs for a hundred or more sites will find it cost effective to create their own discs. Already you can buy a machine for about \$30,000 that can produce CD-ROMs for \$50 each.

School systems will also be able to spread their costs over many users. Animation, voice, and a huge database of information will make educational programs more exciting for students. The current version of *Compton's Multimedia Encyclopedia* on CD-ROM points the way: Click on a picture of Mozart, and you hear an example of his music. Click on a picture of Martin Luther King, and you hear the "I have a dream" speech. With the encyclopedia's SmarTrieve search engine, you can ask, "Why is the sky blue?" and receive a list of articles that contain both words, *sky* and *blue*. Look for similar knowledge-

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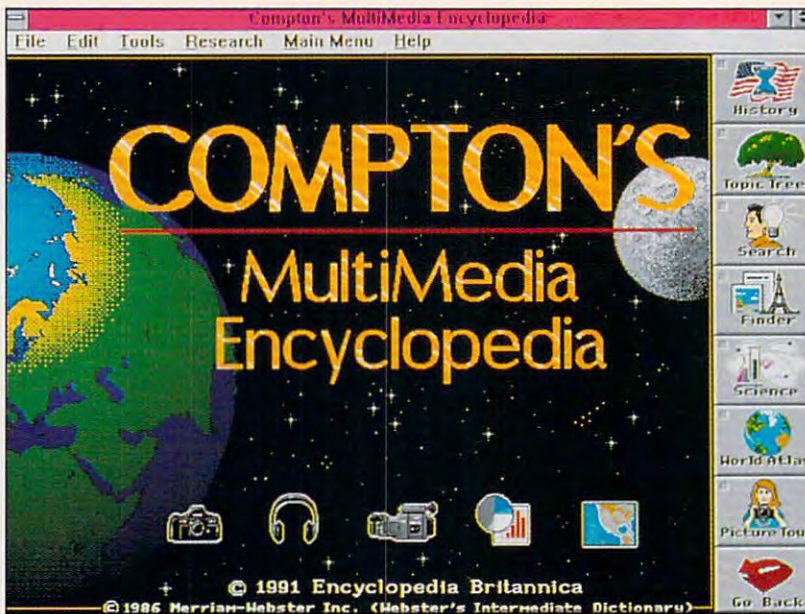
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Circle Reader Service Number 180



Compton's MultiMedia Encyclopedia includes a sophisticated search engine.

based CD-ROM products to be released throughout the year.

How about the home market? Gregg Riker, director of development for Microsoft's Multimedia Systems Group, says, "In the long run, it's the home market that we're excited about." But will home-computer users be willing to pay \$900-\$1,500, plus another \$895 for the software, just to run a multimedia encyclopedia? Until there are enough titles and prices fall for CD-ROM players and sound

cards, most buyers will take a wait-and-see attitude. Microsoft hopes this conference will get the ball rolling on software and that developers will jump on board early.

What will multimedia software for the home look like? It's too early to know for sure, but CD-ROM titles such as Sierra's *Mixed-Up Mother Goose*, Activision's *the Manhole* and *Cosmic Osmo*, and Britannica Software's *Compton's Multimedia Encyclopedia* indicate that we'll see high-

quality graphics, extensive use of spoken voice, and an interface that's easy to use and interactive. Look for recorded-music packages that combine CD-audio tracks with megabytes of background information on CD-ROM, similar to Mozart's *Magic Flute* from Warner Audio Notes and Beethoven's *Ninth Symphony* from The Voyager Company. With Windows' ability to stream video from a CD-ROM disc, Max Headroom might even make a comeback.

Even if CD-ROM is slow to catch on in the home market, Microsoft's multimedia specifications have finally set a viable sound-board standard for the PC. Expect more games and applications to support the real-sound capabilities of the Sound Blaster and future Windows-compatible sound cards. Adding MIDI support to Windows (including a built-in sequencer) will help the growing market for Windows-based MIDI software.

While, at this point, it looks as if multimedia on the PC is still a ways off, don't be surprised if it takes hold in a hurry. Once we see \$300-\$400 CD-ROM players and 20-30 solid titles, multimedia could establish a momentum all its own. Five years from now, we may be talking about the 1990 Microsoft Multimedia Developers Conference as the place where PCs came of age—where static graphics and simple beeps were replaced by full-motion animation and real sounds. I can hardly wait. □

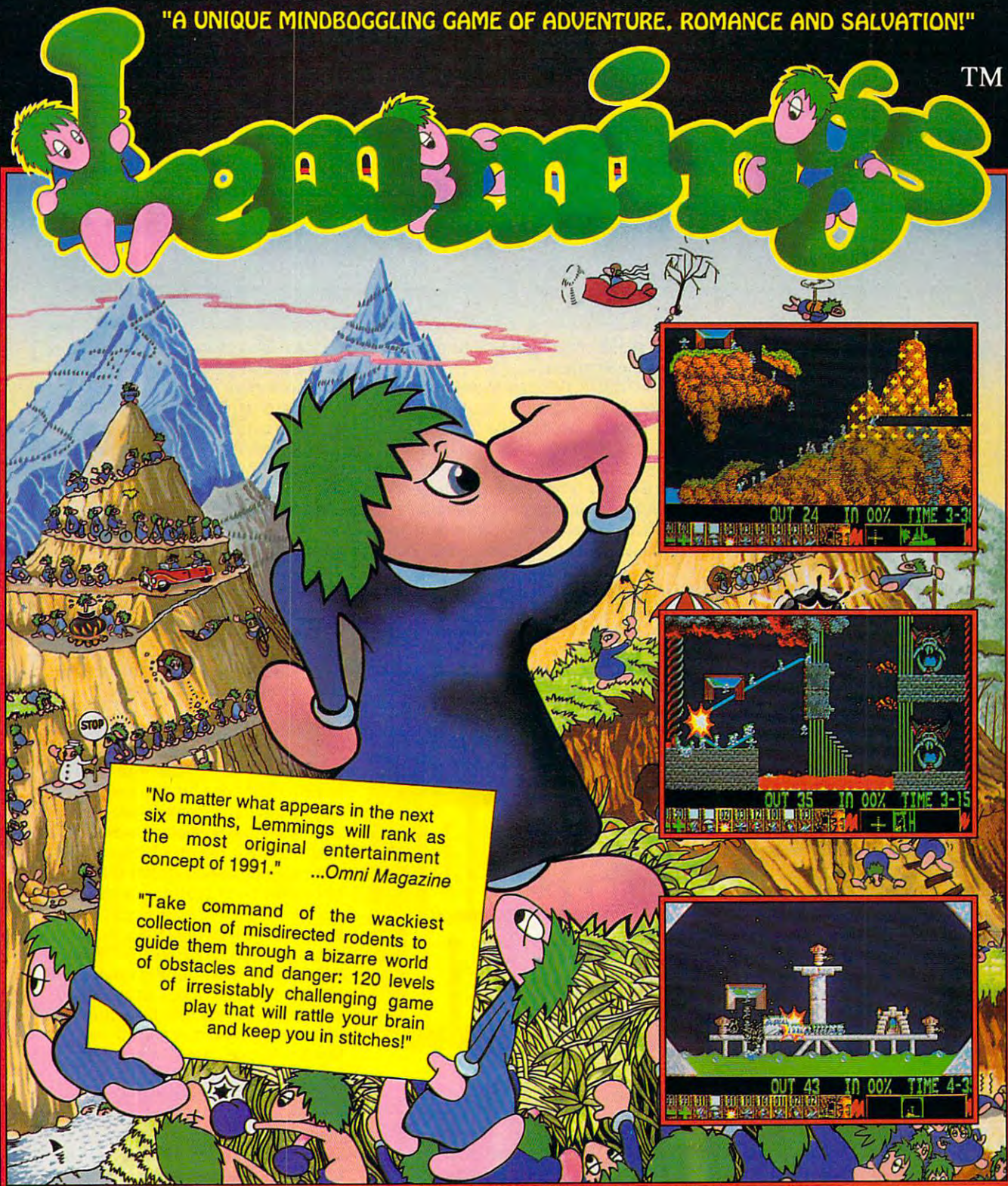
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SHAREPAK

R I C H A R D C. L E I N E C K E R

You've used your computer to optimize your productivity, educate your family, and fill your leisure hours. Now your computer can be used to improve the quality of your life by helping you cultivate a healthy body.

The first program on this month's *SharePak* is called *YOUR Personal Nutritionist*. It gives you an abundance of information about foods and their nutritional contents. It also helps create comprehensive nutritional plans for you and your family. The second program is called *Bio-Rhythm*. It helps you plan another aspect of personal well-being, namely, the synchronization of your activities with your biorhythm cycles. The last program, *WEIGHT GENIE*, lets you know how successful you've been at losing weight by telling you what your ideal weight is and estimating the level of fat in your body.

Our *SharePak* disk includes the very best shareware that relates to each month's editorial theme. We comb the boards and then spend hours testing programs to ensure that the *SharePak* disk is packed with great programs designed to increase your productivity and improve the enjoyment of your computer time.

There's even a money-back guarantee: If you buy one of our *SharePak* disks and aren't satisfied, just return it for a refund. You can also call us for technical support if you have trouble using the programs on the disk. You won't get service like that from many shareware companies out there. With the COMPUTE stamp of approval, you can count on quality.

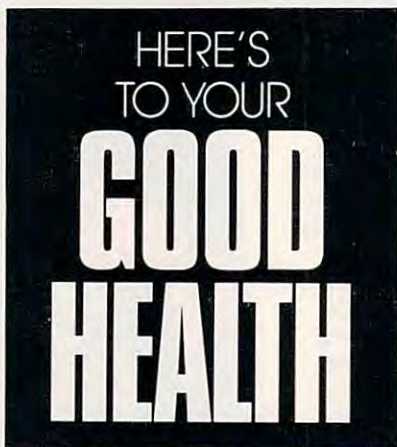
YOUR Personal Nutritionist

Wouldn't you love to stay in perfect health forever? Everyone gets old, but *YOUR Personal Nutritionist* can help you lead a longer and healthier life. It provides information about most foods, plans individual meals, and designs overall nutritional programs and diets. And the program is easy to use. The menus let even novices use the program right away without having

to spend time reading tons of documentation.

YOUR Personal Nutritionist is the ultimate in nutritional programs because it helps you do the right thing. That's better than tracking your bad habits after the fact, as many other nutrition programs do. From the food database you can create and store recipes and attach notes. You can preplan healthy meals using individual food items and portions of recipes from the database. The program also lets you create a daily nutritional regimen.

Besides the long-range planning, *YOUR Personal Nutritionist* lets you analyze meals, recipes, daily regimens,



or single food items for vitamins, minerals, fat, cholesterol, carbohydrates, calories, fiber, and the essential amino acids. The database of foods is extensive, and you can browse it in several ways. An exercise section helps you estimate your caloric needs.

Diet, health, and fitness are concerns for every family. You'll want to get *YOUR Personal Nutritionist*.

BioRhythm

Plenty of people place great value on synchronizing daily activities with their personal biorhythms. Some research gives credence to the idea that biorhythms actually affect people in more ways than we realize. *Bio-*

Rhythm lets you explore this realm with a simple-to-use, easily understood program.

The program collects a small database of personal information. That's because biorhythm patterns are different for just about every person. Birth date and gender are the most important pieces of information.

You can create a chart for one person, or the program will show you a graph for two people. It's very interesting to see how the program rates the compatibility of married couples.

If you register the program, you'll get a version that prints your charts. And with registration comes notification of updates and additions.

WEIGHT GENIE

WEIGHT GENIE is pure simplicity to operate. The program is as friendly as you could hope for, yet it will tell you things about yourself that even your best friends wouldn't—and couldn't. All it requires for input are three simple measurements that you can repeat every morning or once a week for as long as your weight program lasts. Given only these three measurements, *WEIGHT GENIE* will tell you vital information that will make it easier for you to gauge the effectiveness of your efforts to gain or lose weight—and give you an important key to maintaining a healthier body.

Just how easy is the program to use? To start, type *GENIE* at the command line. Then enter your name, age, sex, and weight. The next step is to enter the measurements of your abdomen, forearm, and buttocks. As soon as *WEIGHT GENIE* has this information, it generates the results. You'll learn instantly what your ideal weight is and how much of your weight is fat.

Bathroom scales, make room. *WEIGHT GENIE* is the next step in the arsenal of weight-maintenance programs. If you're serious about your health, this program will make it that much easier to achieve and maintain your proper weight. □



SHAREPAK

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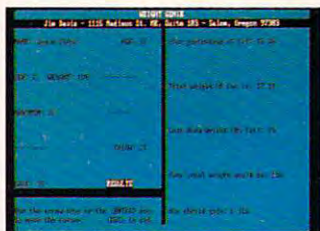
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BioRhythm version 2.0



WEIGHT GENIE



YOUR Personal Nutritionist version 3.2.1

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Your imagination can move mountains. Your hands can move worlds. This is not science fiction, but reality. Virtual reality, to be exact.

Virtual reality (VR) is a phrase used to describe a swarm of futuristic technologies with even more futuristic applications. Among the dreams of virtual reality are robots to probe crippled fission reactors; simulcast video conferences convened in identical rooms scattered from Zanzibar to Arkansas; classrooms that can explore the inner workings of thunderstorms, combustion engines, or the nuclear furnace of the sun; and entertainment for millions as they explore worlds that exist only in the computer.

Loosely based on the idea that computers and other hardware can recreate or enhance reality or, better yet, create artificial realities, even the rough-edged forms of VR test the capabilities of powerful computers.

VR's best-known image is a pair of darkened goggles and a black glove. Both are packed with sensors and trail wires to a high-powered computer or workstation.

Through the goggles you can see a computer graphic representation of a room; turn your head, and the graphics update to make it seem as though your head turns in the alternate reality, too. Motion and position sensors in the glove tell the computer to move you through the room when you point your finger, to grab a computer-generated chair when you close your hand. It's crude but a lot of fun.

Virtual reality would be the supreme computer game, for not only would you be able to truly interact with the game, but if the visionaries have their way, you'd be able to write your own script, too, simply by making choices. Imagine playing an Ultima game in which *you* swing the

sword and *you* make the decisions about the scope and direction of the game. Left here or straight ahead? Fight or run away? VR would be the ultimate interactive role-playing game.

Virtual reality is, to put it kindly, in its infancy. Even its most fervent proponents believe that years, maybe decades, stand between today's VR and tomorrow's fully realized virtual reality. In the meantime, its advocates hold conferences and seminars to explain what they're doing and argue about where they're going. Cyberthon was one such conference. Sponsored by the Whole Earth Institute, publisher of the *Whole Earth Catalog*, Cyberthon held court in San Francisco last October. The major VR names and faces were there, from Jaron Lanier, creator of the Dataglove, to William Gibson, the science-fiction writer whose novel *Neuromancer* inspired many VR developers and designers.

This is less an account of Cyberthon than a report from the fringes of VR. Put on your goggles, slip on your gloves, and join us for a ride through virtual reality's dreamscape.

The Cyberthon Marathon

Sleep deprivation is the poor man's virtual reality.

Why spend thousands on unproven technology, one-of-a-kind graphics boards, and sensory-stimulation goggles and gloves when you can get the same results—an illusion of alternate realities—by going without sleep for 30 hours or so?

Scheduled as a 24-hour, round-the-clock conference, Cyberthon waxed and waned along with the attention spans of its attendees. Early in the day, crowds pressed through a rat's maze of wooden corridors, black curtains, and small, hot spaces. By late evening, many had seen enough and deserted the warehouse district

for a good night's sleep. Two o'clock rolled around, and the desperate stood in line to lie in the La-Z-Boy of the future with goggles masking reality in the Sense8 exhibit. And every hour, on the hour, zombies straggled out to check the lottery boards to see if they'd struck it lucky and won a session with what little hands-on virtual reality hardware was around.

Conversation, always strange at computer conferences and stranger at this one, where practitioners haven't even decided what it is they're doing, became even more bizarre around 5:30 a.m. Question-and-answer sessions trailed off as people forgot what they were driving at, while some people simply nodded off in the front row. "Check out the airplane," said one conferee, talking about an airliner reproduction tucked into a corner. No, not because it was interesting, he said, but because the seats were cushy and you could lean back and nap.

Cyberthon's flavor was pure Woodstock, the celebration of something new and exciting. I haven't seen so many tie-dyed shirts since high school 20 years ago. But the enthusiasm, the idealism, the naiveté were infectious.

Similarities to the opening days of personal computers are too strong to dismiss. A hot, new technology that showed great promise, struggling along on the dreams and sweat of young developers and engineers who string garlic around their necks at the first sign of a pinstriped suit. People worried about good and evil applications and hoped for the democratization of the technology—and wondered what that would do to ordinary folk.

I'll be following virtual reality as long as it hangs in there. That fascination is what the Cyberthon marathon left me with, even after I'd caught up on my sleep. ▶

G R E G G K E I Z E R



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UNIPHOTO/PICTOR

Hardware Makes It All So Unreal

The heart beating in virtual reality is a computer. And those computers are a lot more powerful than the 286 system you've got in the den or home office.

Sense8 was one of two companies to bring full goggles-and-gloves VR rigs to the Cyberthon site. With its software running on a Sun SPARCstation (a high-end workstation that runs in the \$8,000-\$10,000 range), Sense8 put its VR viewers at ease by seating them in a Flogiston chair, a recliner that looks as if it escaped from George Jetson's living room.

Traditional VR goggles over the eyes and a modified Mattel Power Glove on one hand completed the gear (the Power Glove is a player controller developed for Nintendo videogames and is a direct descendant of the Data Glove, the glove-like sensing device used in many virtual reality setups). The SPARCstation generated the graphics, then pumped them to the goggles, while the Power Glove (and a softball-sized controller for the other hand) guided you through the computer-made artificial environment.

Not only does this VR graphic processing take power—and a lot of it—but the rigs are temperamental. You can't expect reliability from handcrafted graphics boards or snake dens of cables. One VR setup went down for the count when it overheated; another's blank goggles puzzled its operators until they noticed a cable had been kicked loose.

More Cyberthon hardware explored other worlds of virtual reality. A flying mouse let users point and click their way through 3-D animations (raise the mouse off the desk, and it sends the pointer into 3-D mode). Other devices gave tactile feedback on your fingertips (virtual pain?) or a stereoscopic view of remote television cameras through a binocular-like boom contraption. And in one room, you could watch yourself play with a prerecorded band as an Amiga 2000 (packed with three proprietary graphics boards and connected to video and MIDI equipment) overlaid a live shot of you with a taped music video. The Mandala Virtual World System runs a paltry \$19,600, a mere pittance in the unreal costs of virtual reality.

Computers make virtual reality possible. But don't expect the technology to drop into your family room or to be the price of a Nintendo any time soon. As Jaron Lanier, creator of the Data Glove and head of VPL (the company many consider the leader in VR), said at Cyberthon, "Everyone wants to take virtual reality home, but even I can't afford it."

The View Through the Goggles

Though there were nearly three dozen exhibits at Cyberthon, the ones that mattered were the three goggles-and-gloves demonstrations by VPL, Sense8, and Autodesk. Because of the limited amount of gear, Cyberthon held hourly lotteries whose winners sampled virtual reality firsthand.

I got behind the Sense8 equipment nearly 18 hours into Cyberthon. For ten minutes I walked through a landscape created by a computer.

Look through the goggles, and you get a glimpse of the Sense8 virtual reality as generated by a Sun SPARCstation. All angles and bright colors, the room you see looks like an office cubicle, complete with shelves and chair. By alternately moving the hand



The virtual office: Some VR sports a cartoonlike appearance.



The glove and goggles make it possible.

encased in the hot-wired Power Glove and pressing on a small control ball with the other, you "move" around and outside the room. (Actually, you stay flat on your back in a formfitting space-age recliner while the computer changes the sights sent to the goggles.)

It's easy to move about, but not so easy to do anything even mildly coordinated, like grabbing that pesky chair and putting it on the countertop. But you can do some amazing things, like floating above the room for a bird's-eye view or even sinking through the floor to "swim" beneath the room and emerge under a desk.

You find yourself tilting your head back to look up in the computer-constructed playroom, slowly twisting your neck to look around. As sights shift before your eyes, the feeling is both mundane and magical. You get

used to it all so quickly. Maybe there's something to VR, you think. Maybe all the mystical talk about the technology and how it will change communication, play, and work isn't so mystical after all. That's when you know you're hooked on VR.

Sharing of the Imagination

"What I'm worried about is that everyone will get bored waiting," said Lanier.

His comments were echoed by several virtual reality practitioners and developers. They're afraid that expectations have already outstripped their ability to deliver workable (much less affordable) virtual reality.

In other words, it's going to be a long time before virtual reality entertains and educates us in the home or helps us in the workplace or the laboratory. Stuart Brand, author of *The Media Lab*, said, "It'll take ten years to live up to the expectations of today."

If Brand is right and it's the turn of the century before the technology is viable, what will VR be? That depends on whom you talk to.

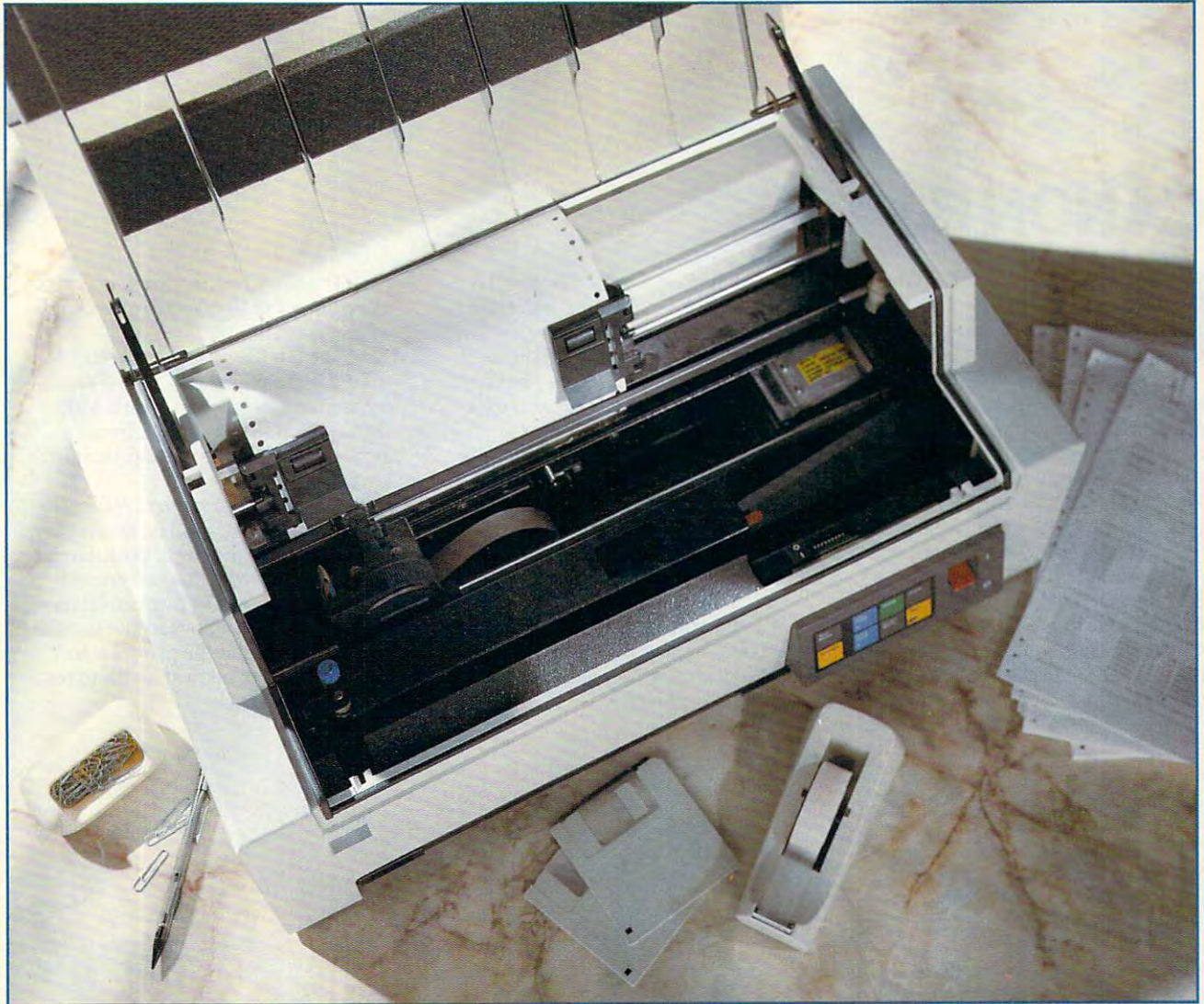
According to Lanier, the number one application for VR will be in design and prototyping. Autodesk, famous for its PC design program *AutoCAD*, obviously agrees. Autodesk is hot on the VR development trail. Other uses, said Lanier, will be as complex interfaces for communication and in training applications.

Other VR developers have other ideas. Larry Leifer of Stanford University and Tofa Corporation envisions VR as a tremendous tool for the physically handicapped, especially as some of the VR technology spins off and is put to use in rehabilitation robotics, intelligent machines to help the handicapped. "Virtual reality is a model of the real world," said Leifer as he showed a video of a robotic arm that fetched paper, ran a printer, and did more—all at a paralyzed computer analyst's spoken commands.

Brenda Laurel of Telepresence sees virtual reality's entertainment possibilities. "It reminds me of the way things started in the computer game business," she said. "Games began with engineers doing cool things. They designed games for themselves."

Virtual reality's entertainment opportunities shouldn't be limited so quickly, and they shouldn't duplicate computer games, Laurel said. Instead, she said that virtual reality's practitioners must ask, "What do we really want this for?"

Maybe all we want is what Lanier wants. "Virtual reality is the media for the sharing of imagination. Not a sharing of the physical world." □



MARK WAGONER © 1991

Each month *COMPUTE*'s Test Lab focuses on a specific kind of hardware and offers you the information you need to guide your understanding of the technology and to make informed buying decisions. Our comprehensive system benchmarks are accompanied by in-depth explanations of the tests and the technology. Attractive graphics clarify differences in features and performance. You also get the expert product reviews that PC activists have come to expect from *COMPUTE*. This month, Test Lab examines four dot-matrix printers, two bubble-jet printers, and three laser printers. So whether you need to print out a recipe or a dazzling desktop-published business report, read on. These printers can handle just about any print job you have.

Canon BJ-10e
Canon BJ-330
Fujitsu DL4600
NEC Pinwriter P6200
Qume CrystalPrint Express
Qume CrystalPrint Publisher II
The Printer Works JetScript-CX
Star Micronics NX-1020 Rainbow
Star Micronics NX-2420 Multi-Font

CANON BJ-10E

Compact, light, and quiet—the Canon BJ-10e printer offers IBM ProPrinter X24E emulation and quality output.

The easy-to-use Bubble Jet parallel printer is more like a sophisticated dot-matrix than a low-end laser printer. While not particularly rugged, weighing four pounds and sized 12.2 × 8.5 × 1.9 inches, the BJ-10e could be used, with care, as a portable printer.

In both High Quality and Economy modes, the BJ-10e operates at 83 characters per second (cps). The darker HQ mode uses a 36 × 48 dot-matrix; Economy mode uses a highly readable 18 × 48 dot-matrix. Text characters include proportionally

spaced 5-, 6-, 8.5-, 10-, 12-, and 17-character-per-inch fonts, selectable from the control panel or by software control. You get bold, underlined, subscript, and superscript—but not italic—styles. The BJ-10e also uses downloadable fonts.

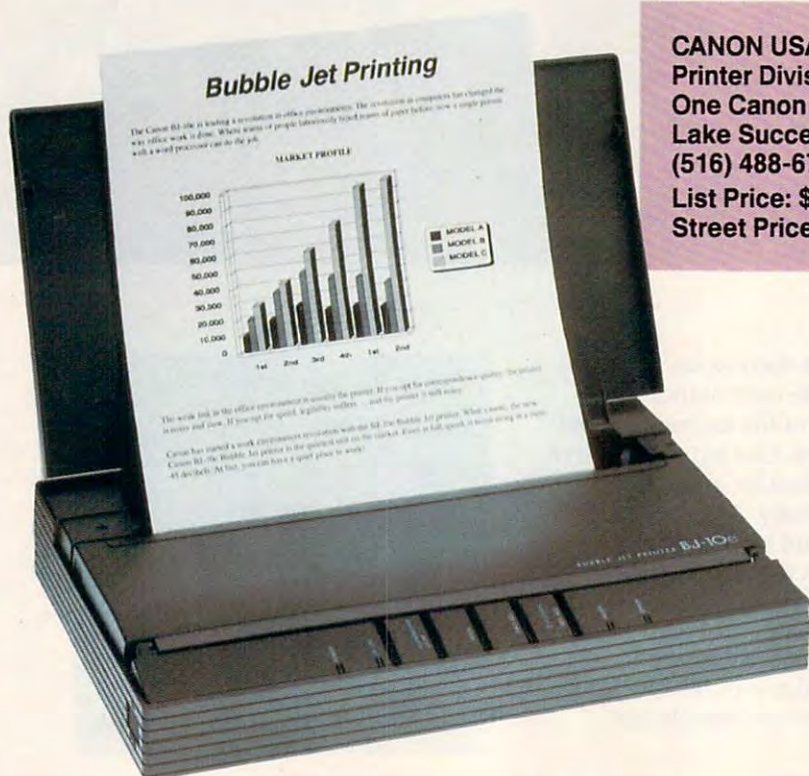
The Bubble Jet printer can produce graphics using 8-, 24-, or 48-dot formats and offers resolutions of 60, 120, 240, or 360 dots per inch, depending on which printer drivers your software provides.

Easily replaceable, the Bubble Jet's ink/printhead cartridge lasts for 700,000 characters. The printhead is part of the cartridge, reducing printhead wear problems.

The ni-cad battery pack operates the printer for 40 minutes on a charge of about ten hours.

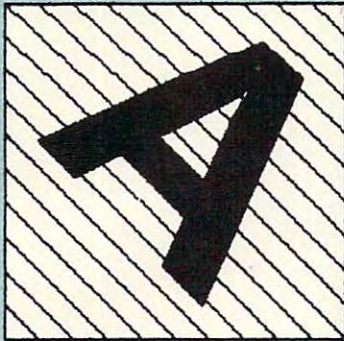
The BJ-10e prints on 14- to 24-pound plain paper, in 7.2- to 14-inch lengths and in 7.2- to 8.5-inch widths. (Since the BJ-10e is not an impact printer, you can't use it to print multi-part forms.)

A highly accurate feed mechanism makes feeding single sheets easy. You can adjust the paper position vertically with forward and reverse adjustment buttons. To print envelopes, just use the envelope-feed slot located in the bottom and the printer stand that folds out to allow the unit to rest upright on its back.



**CANON USA
Printer Division
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(516) 488-6700
List Price: \$499
Street Price: \$332***

*Test Lab street prices are an average of prices advertised in computer magazines and national newspapers during March 1991.



This GEM Artline sample illustrates output quality.

The Canon ASF-6410 Auto Sheet Feeder is a useful option, but it holds only 30 sheets of letter, A4, or B5 paper. The printer stands vertically, and the sheet feeder attaches to feed paper through the envelope-feed slot. You can also manually feed paper with the sheet feeder attached.

A special DIP switch tells the printer whether you're using the sheet feeder. You'll find all the printer's DIP switches within easy reach and labeled with abbreviated descriptions.

You'll pay \$90 for the ASF 6410 sheet feeder, \$50 for a ni-cad battery, \$25 for each cartridge, and \$35 for a replacement AC adapter.

The manuals for the printer and sheet feeder are brief but thorough, with plenty of drawings to guide you. Unless you plan to design your own fonts or control the printer's graphics features through programming, you probably won't need the optional programmer's manual. ▸

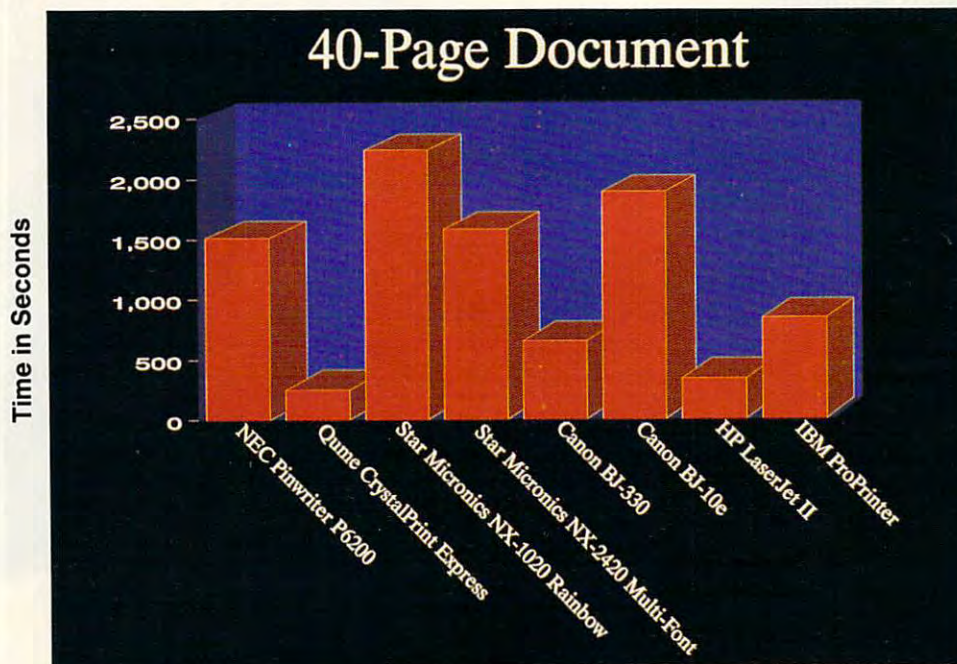
J. BLAKE LAMBERT

What the Benchmarks Mean

Speed continues to play a significant role in everyday computing and printing. Nobody wants to waste time waiting for printouts, so our printer benchmark tests measure how long a particular printer takes to produce output from an everyday application, the kind you might use in your home or office.

Our tests are all timed, so as you compare the results of these tests, keep in mind that the lower the numbers (or the lower the bar in the graph), the faster the printer performed. Setup times are represented in minutes; other time figures are in seconds. The quality of output, a separate issue altogether, can be compared using the output samples that you'll find elsewhere in this section.

- 40-page text document
- 4-page GEM Artline graphic output
- 2-page GEM desktop published newsletter
- 80K Lotus spreadsheet
- 2 PerFORM ruled forms
- Installation time



CANON BJ-330

There's an entire cottage industry devoted to creating huge, heavy, sound-dampening enclosures for high-speed wide-carriage printers. Most of these heavy, bulky printers can be heard in the office on the other end of the hall and shake the entire desk, if not the room.

Now there's a light, fast, and quiet alternative. Canon's BJ-330 uses bubble-jet technology to provide fast, crisp, clean wide-carriage output without the need for earplugs, enclosures, or a reinforced desktop. In fact, the only sounds you'll hear from the Canon are the printhead moving back and forth and the paper being fed through the printer.

Instead of striking a fabric ribbon with a set of pins or burning toner onto a page with a laser, the Canon printer fires ink droplets at the paper from thin nozzles. The term *bubble jet* comes from the process used to spray the ink. When ink in the thin nozzles of the printhead is heated rapidly, tiny bubbles are produced. As the bubbles expand, ink is ejected from the nozzle.

Early ink-jet printers, such as the original Hewlett-Packard DeskJet, used a water-soluble ink that would smear if any liquid touched the page. The Canon's ink is water-proof (as is HP's new DeskJet ink) and prints on standard fanfold, letterhead, or copier paper. You don't have to use the hard-to-find and expensive ink-jet paper required by earlier printers.

While the Canon uses an ink-jet technology similar to that of the HP DeskJet, which emulated an HP laser printer, the Canon emulates a dot-matrix printer (either the Epson LQ-1050 or IBM ProPrinter XL24). Because of this, the Canon's graphics output is only a little better than the dot-matrix output of printers it emulates. HP's similar offering, on the other hand, provides graphics output

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Street Price: \$641



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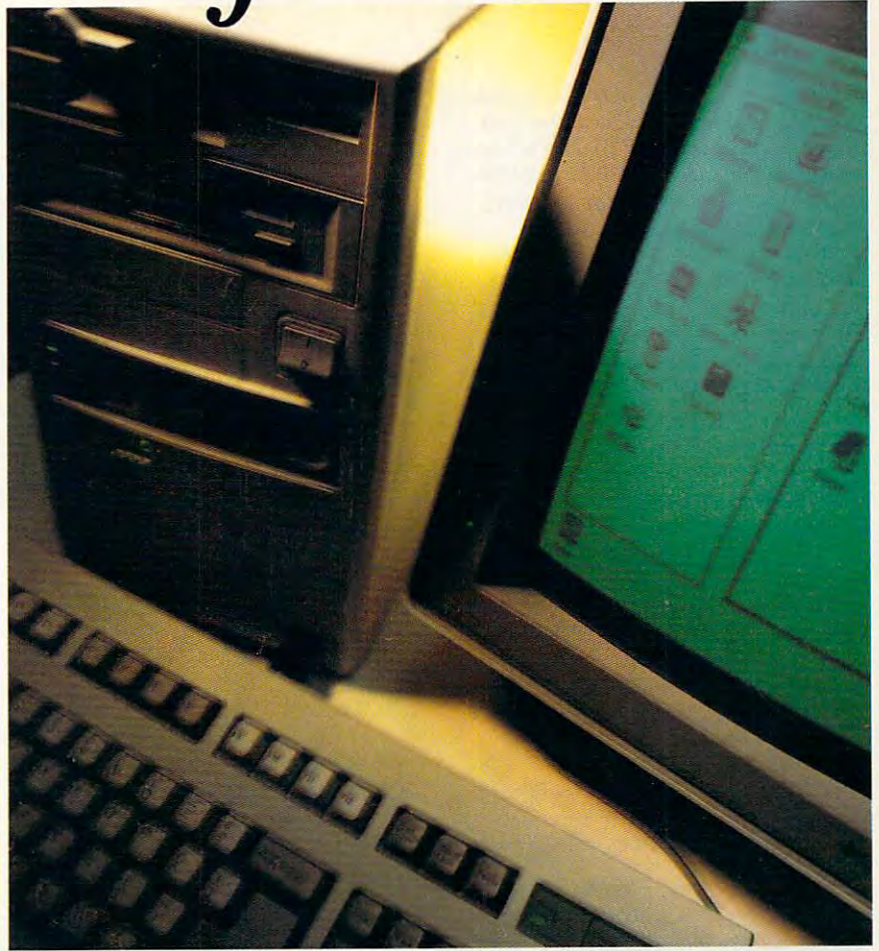
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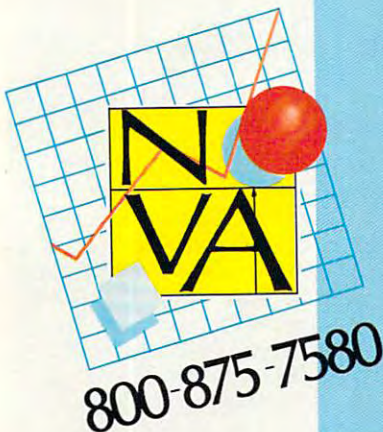
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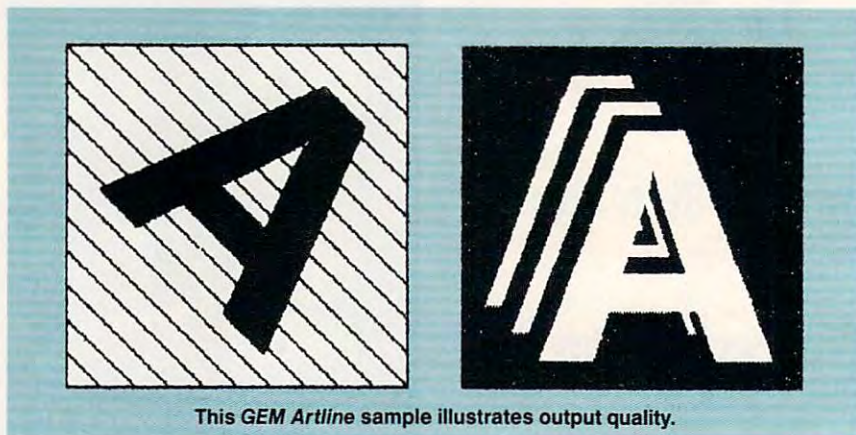
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nearly as good as that of its laser counterparts. The DeskJet's fonts are also more laserlike than the BJ-330's. The newest HP ink jet, the DeskJet 500 includes scalable Compugraphic laser-printer-style fonts, which can be printed at just about any point size. The Canon's dot-matrix-style fonts are only available in fixed point sizes. Font cards that add new typeface styles and sizes are available for the Canon, however.

While it doesn't quite match the DeskJet in output quality, the BJ-330 eclipses it in flexibility. The HP printer (and most lasers) will accept only single-sheet letter- and legal-size paper; however, the BJ-330 accepts paper ranging from 3½ to 17 inches in width. The printer handles fanfold and single-sheet paper. A must-have option is the dual-bin sheet feeder. With both bins attached, the printer will automatically feed both plain paper and letterhead, switchable with the press of a front-panel button. Envelopes can be loaded individually or installed in a sheet-feeder bin.

There are three selectable paper



This GEM Artline sample illustrates output quality.

paths: top, rear, and front. You don't have to remove the fanfold or sheet-fed paper to run a special form or envelope through the printer; just place it in the front slot.

You set rarely changed options, such as emulation and interface selections, using a set of DIP switches on the back of the printer. Fonts, paper bin selection, print quality, and other

options can be easily modified using a number of easily accessible front-panel switches.

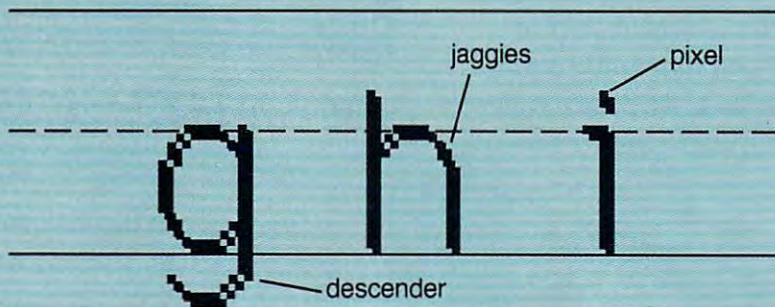
This printer is a great example of doing it right—after a month of heavy use, I have no complaints. If you need a fast, quiet printer with flexible paper handling and don't need to print multipart forms, fire up a Canon BJ-330.

DENNY ATKIN

Descenders, Pixels, and Jaggies

Since the early days of computing, certain nightmarish apparitions have haunted computer printouts. One is the descender. Early computer printers were unable to hang the lower part of a lowercase *g*, *j*, *p*, *q*, or *y*. Instead, the entire lowercase letter was elevated to fit within the seven or eight pins used to print the bodies and ascenders of other letters. This made a computer printout look terrible and could even be confusing because there was little or no difference between an upper- and a lowercase *p*. Fortunately, this problem was solved to some extent by the appearance of 9-pin printers and eliminated entirely with the advent of the 24-pin printer.

Graphics resolution has also long been a problem. To begin with, printers often took the graphic directly from the computer screen, transferring it pixel by pixel to the page in the form of ink dots. With the 72-dots-per-inch resolution found on most computer screens, that made for a very blocky drawing. Even when paint programs were supplanted by draw programs,



which could send higher-resolution graphics to the printer, the problem caused by lower printer resolution remained.

The term *jaggies* refers to the saw-blade (or stairstep) appearance of slanted or curved lines. Jaggies occur because you are trying to print a line that is not perfectly straight and perfectly horizontal or perfectly vertical—the only kind of line a raster device can create. All printers except daisy wheel printers and plotters are actually raster devices, which must approximate

curves by carefully placing assemblages of straight lines. You don't notice the jaggies so much with a laser printer (and even less with a typesetter) because the raster lines are much finer than the raster lines of a dot-matrix printer or your monitor.

As laser printers achieve ever higher resolutions and employ tricks like the Hewlett-Packard LaserJet III's variably sized dots, jaggies will become tamer creatures that may one day disappear from computer printing.

—ROBERT BIXBY

FUJITSU DL4600

As soon as you lift the Fujitsu DL4600 from its shipping box, you'll realize it must be a sturdy printer—it weighs 40 pounds. With dimensions of 7.5 × 22.9 × 15.2 inches, this wide-carriage work-horse isn't a good choice for the cramped home office. But if you need a heavy-duty, high-performance, high-volume dot-matrix printer and you've got the room and a sturdy printer stand, the Fujitsu may be for you.

The large size of this 24-pin printer allows it to use paper up to 16.5 inches wide, so it's a good choice if you're printing ultrawide spreadsheets or proofing tabloid-sized desktop-published documents. The DL4600 is also worth looking at if you need to do rough proofs of pages that will eventually be color-separated or printed on a color ink jet.

While it's true that newer printer technologies will generally provide faster, quieter, and higher-quality output, good old tractor-fed impact dot-matrix printers still offer some advantages. First and foremost is paper handling. The DL4600 will accept friction-fed single sheets and standard tractor-fed paper, and it has an optional cut-sheet feeder. If you need to print a long database listing on one strip of tractor-fed paper, a laser printer won't do. Also, only impact printers will allow you to use carbon forms to print multiple copies simultaneously—the Fujitsu supports one original and up to four copies.

When you run out of ink or toner in an ink-jet or laser printer, you're stuck. With the traditional fabric-ribbon technology used by the Fujitsu, the print gradually begins to fade. If you're printing archival records or other non-quality-sensitive documents, you can use an old cloth ribbon, extending its useful life. Cost per page is less than with newer printer technologies.

While not quite up to the standards of laser and ink-jet output, the

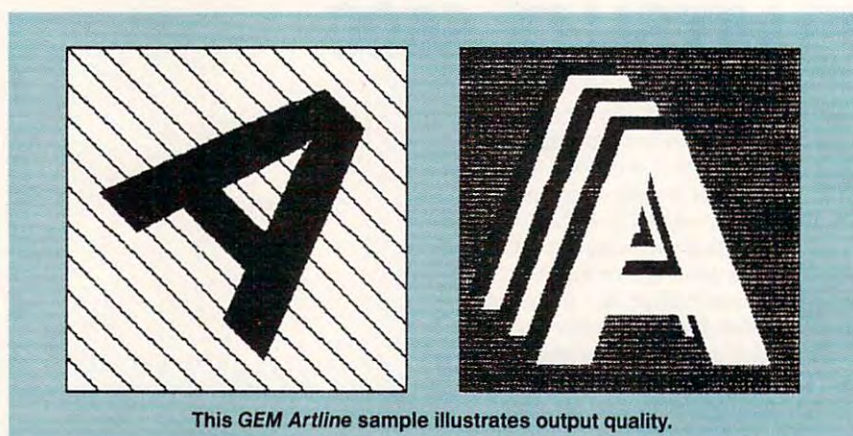
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(408) 432-1300
List Price: \$1,395
Street Price: \$1,001



DL4600's output is about as good as you can get with dot-matrix technology. The printer's four built-in letter-quality fonts are very cleanly formed and display no dottiness. Correspondence- and draft-quality fonts aren't as crisp, but they're still very readable. You can also plug in optional font cards to add typefaces such as Orator, Scientific, and Swiss. Fujitsu also sells a program that allows you to use PostScript-style fonts with the printer. Graphics output is good, with up to 360 × 360 dots-per-inch resolution.

The DL4600's four-color ribbon produces eight pure colors for text. Printer drivers included with *Windows 3.0*, *AmigaDOS*, and many paint and desktop publishing programs will dilute those colors to produce thousands of apparent shades. Color output looks washed out when compared to that of ink-jet and thermal transfer printers—the ribbon technology doesn't allow for much saturation. However, the cost per page is much less than with those technologies.

The printer uses the Fujitsu-specific DPL24C command set, which



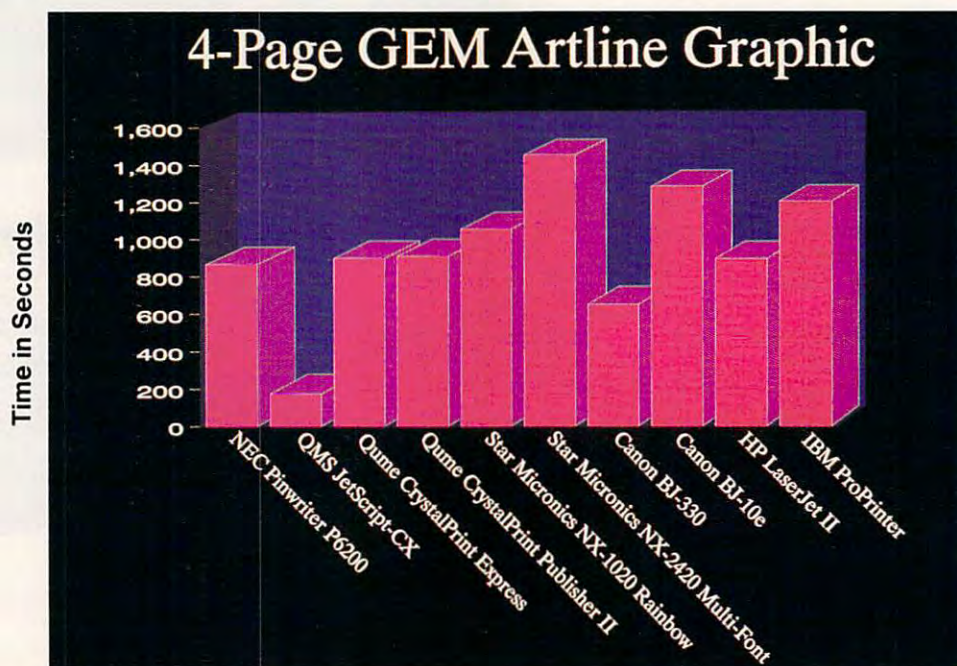
This GEM Artline sample illustrates output quality.

includes most Epson LQ and IBM ProPrinter commands. I had no compatibility problems using Epson LQ drivers with *GeoWorks Ensemble* and *AmigaDOS*. Change printer settings with touch-sensitive buttons and the LCD display on the front of the printer—there are no DIP switches to set.

The only problem in six months of using the DL4600 was jammed paper. Tractor-fed paper kept moving

off the track and eventually would snag. I ended up using the single-sheet autoloading feature, which worked flawlessly. The jams might cause buyers to hesitate when making a final decision about what printer they want in their home offices. But for overall good performance in a heavy-duty color dot-matrix printer, the Fujitsu is still very much a contender. ▸

DENNY ATKIN





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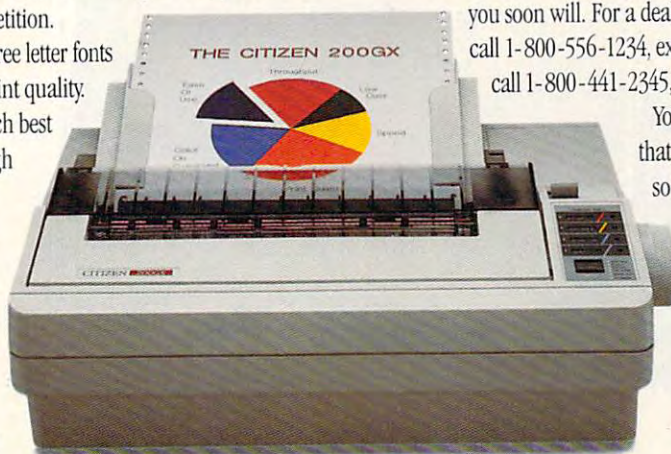
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NEC PINWRITER P6200

NEC markets the Pinwriter P6200 as a midrange 24-pin dot-matrix printer intended for general office applications. And there's much here that will appeal to the office manager or anyone else looking for speed, flexibility, and durability. I had a chance to put it through some grueling paces, and I've found a lot to like in the Pinwriter P6200.

As dot-matrix printers go, this one is fast—300 characters per second (cps) in high-speed draft mode, up to 100 cps in standard letter-quality mode. I dislike waiting around for a printout, and the P6200 offers several features to help speed me through as-

signment letters, memos, reports, and those last-minute handouts for the meeting that begins in ten minutes. The 80K buffer accepts a print job and returns control of the computer to me pronto—no waiting around for the buffer to fill and empty, fill and empty. I can move to my next editing job while the last one is printing out.

If I suddenly need to switch from continuous paper to the company stationery, I don't waste time loading and unloading paper on the tractor. Instead, the P6200 lets me park the continuous paper out of the way, load a single sheet (even 24-pound letter-head) for a quick letter, load the enve-

lope for a quick address, and move the continuous paper back to the printhead. Not all printers handle envelopes well, but this one does—no more trips to the typewriter just to address an envelope. And instead of waiting for a form feed to give me access to a perforation, I simply use the Tear Paper button on the control panel, which advances the paper just to the perforation. Eight seconds later, the paper retracts, ready for the next print job. I save time and paper.

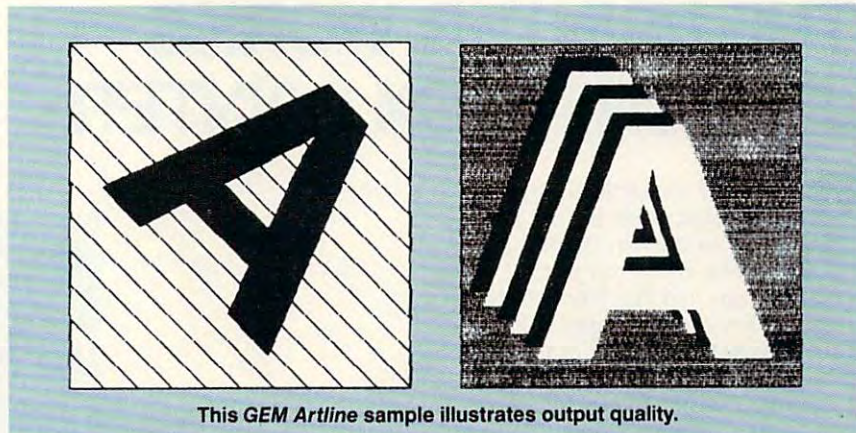
I found the control panel accessible and relatively easy to use effectively once I studied the manual and learned the multiple uses of some of



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the buttons. The manual, fortunately, provides excellent explanations, plenty of illustrations, and a host of cross references. For the less mechanically inclined, actual photographs, rather than illustrations, might have better clarified and simplified setup and other procedures. The index, too, might have been more comprehensive. I looked unsuccessfully there for *emulation* and *specifications*. The manual does, however, provide a glossary, troubleshooting tips, and extensive information on just about any other printer topic relevant to this particular unit. Use the excellent table of contents, and you'll find all kinds of emulation information. There's also a quick reference guide.

Eight resident type fonts and variations give you lots of options so long as you can find the right driver. You get Draft Gothic, NEC's speedy proprietary LQ Quick Gothic, LQ Courier, LQ Prestige Elite, LQ ITC Souvenir, LQ Bold (proportional spacing), LQ Times (proportional spacing), and LQ Helvetica (proportional spacing). For all nonproportional



This GEM Artline sample illustrates output quality.

tional fonts, 10-, 12-, 15-, 17-, and 20-pitch type is available. If eight fonts aren't enough for you, the P6200 will take several optional font cards.

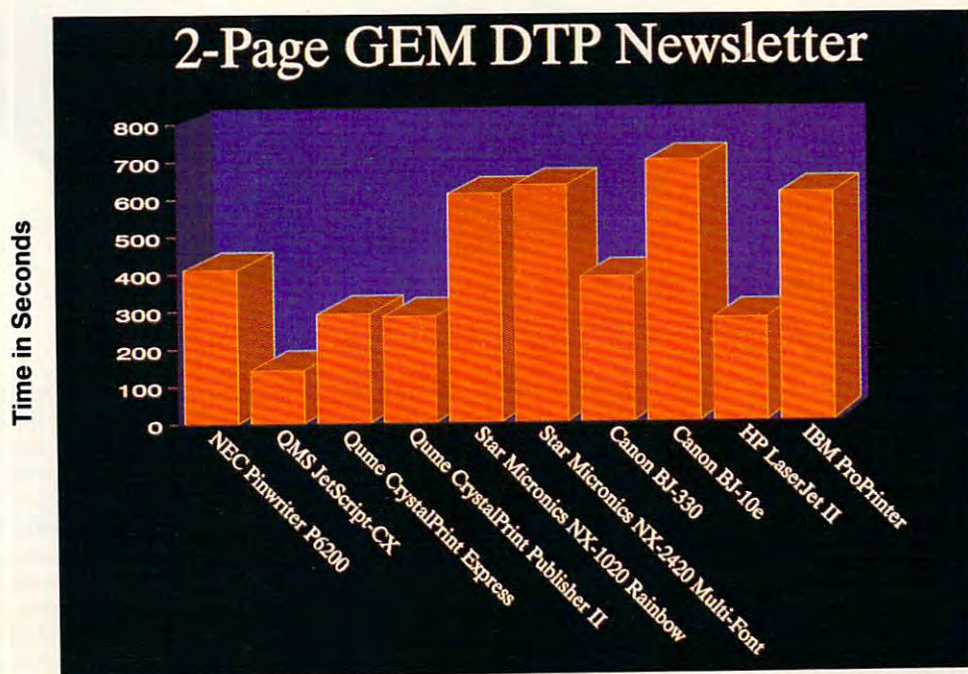
You must pay extra for IBM X24E/SL24E emulation, a serial interface, the color printing kit, the pull tractor (required for bottom feeding), and the sheet feeder.

According to NEC, the noise level is half that of earlier 24-pin printers.

If you remember the old printers, you'll appreciate the difference, and there's a quiet setting if you need it.

At \$749 retail for the 80-column P6200 (\$999 for the wide-carriage P6300), printing doesn't come cheap. But the hardware is solid and looks quite durable. If it holds up anything like the old NEC Spinwriters I've used, it should last for quite some time. >

MIKE HUDNALL



THE PRINTER WORKS JETSCRIPT-CX PRINTER

When you want true Adobe PostScript capability but you don't want to pay the authentic price, where can you go? Until now you had the choice of purchasing a low-cost PostScript clone, either resident in a printer or in a plug-in cartridge, or laying out the kids' college tuition money for a high-cost Adobe PostScript printer. But now you can purchase a real eight-page-per-minute, 300-dot-per-inch laser printer with genuine PostScript for approximately the same price as a LaserJet IIP. The Printer Works pairs reconditioned laser printer engines with the QMS JetScript product to give you just that.

JetScript consists of a long 8-bit card, a video interface cable, and the PostScript language on four double-density disks. It turns your computer and printer into a team. The PostScript interpretation that normally takes place inside the printer is performed on the board inside the computer; then the computer takes control of the imaging hardware inside the printer via the high-speed video interface, which generates the graphic.

The card comes with 3MB of RAM, so the unit doesn't have to steal very much RAM from your computer (the software uses only 3K of your system memory). You get roman, bold, italic, and bold-italic versions of Times, Palatino, Helvetica, Avant-Garde, Bookman, Courier, New Century Schoolbook, and Helvetica Narrow, plus Zapf Chancery, dingbats, and symbols—in short, the entire Apple LaserWriter Plus font list.

The installation is fairly straightforward, if you're comfortable installing boards and if you take the time to read the instructions. The software has to be installed first (a highly automated procedure); then you have to make sure certain jumpers are in the

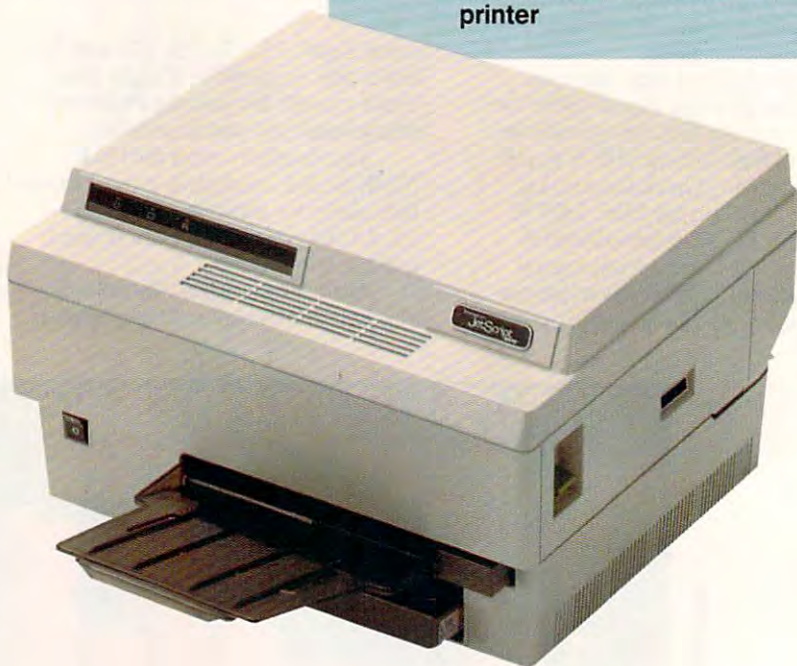
right position on the board. You slip the board into an empty slot and string the ten-foot cable to the printer. Install the toner cartridge, and you're in business.

Though inexpensive and relatively simple to set up, the JetScript package has its drawbacks. Because the PostScript is stored on your hard disk, you sacrifice about 30 seconds each time your computer boots while Post-

THE PRINTER WORKS

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Script loads into the JetScript RAM. The printer may cost the same as a Hewlett-Packard IIP, but it takes up a slot and has the footprint of a standard-size NEC laser printer. Furthermore (and this isn't talked about very much), Adobe-sanctioned PostScript has some very real shortcomings that might force you to make compromises you could avoid with LincPage or some other PostScript clone. ▸

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Ventura Publisher had no trouble printing graphics and heavily formatted text on the JetScript-CX printer. Steps had to be taken to simplify very complex Corel Draw graphics before they would print—a problem with PostScript, not the printer. If you are interested in a machine to do laser typesetting or proofing for desktop publishing or if you are interested in doing design or illustration work, this would be a worthy investment.


The JetScript card and new laser printer carry a one-year warranty. The refurbished laser printer comes with a 90-day warranty that can be extended to a year for \$75.

ROBERT BIXBY

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Cons: Noisier than other types of printers, lowest print quality

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Price Range: \$275-\$2,000
Print Quality: Dots per inch as good as or better than lasers', but larger dot size—overall print quality somewhat less than for laser printers
Pros: Best choice for labels and continuous and multipart forms
Cons: Noisier than other types of printers

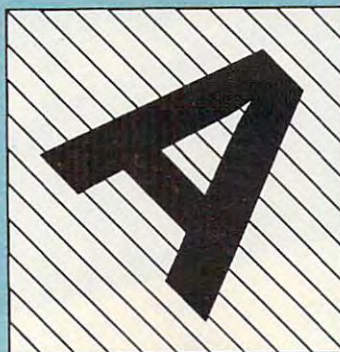
Ink-Jet Printers

Price Range: \$330-\$2,800
Print Quality: Almost as good as that of laser printers
Pros: Quieter than dot-matrix printers, faster than laser printers when printing graphics
Cons: Problem with some inks that smear when wet, slower than laser printers when printing text

Laser Printers

Price Range: \$800-\$20,000+
Print Quality: Highest resolution, PostScript printers compatible with even higher-resolution typesetters
Pros: Capable of creating camera-ready pages for many types of publications because of their small dot size and high resolution
Cons: Require special labels that are designed to withstand heat, still expensive for home use despite the recent drop in prices

—DAVID ENGLISH



This GEM Artline sample illustrates output quality.

QUME CRYSTALPRINT EXPRESS

What kind of printer costs \$5,600? Or to put it another way, why would anyone want to pay \$5,600 for a printer?

In the case of Qume's CrystalPrint Express Page Printer, your money buys PostScript emulation, a 32-bit RISC processor that dramatically cuts down on the time you have to wait for your documents, and the option to print at twice the resolution of a standard laser printer (600 × 300 dpi, as well as the more usual 300 × 300 dpi).

You also buy the freedom to use your printer with both PCs and Macs, as well as many LANs (Local Area Networks). Finally, most buyers won't actually pay the full list price. You could expect to pay about \$3,600–\$4,200 if you order from one of the discount mail-order houses.

Is it worth it—even at the discounted price? Only if you're doing a lot of desktop publishing. Otherwise, you'd be better off with a slower, and cheaper, laser printer. This printer is appropriate only if you print hundreds of documents a week and need the higher resolution.

I assume the desktop publishers are still with me and almost everyone else has turned to the next page. So let's dig a little deeper into what makes this printer tick. One potential problem with the CrystalPrint Express is its PostScript emulation—it's not real PostScript but a PostScript clone. I didn't have any problems with the printer in its PostScript mode (it has a LaserJet mode, too), but I can't help feeling that, for the money, you should be able to get the real thing.

Because many desktop publishers send their documents out to be print-

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CAT. #	DESCRIPTION	NSI
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30F5360	2MB Upgrade PS/2 30 286	128.00
6450372	2MB Memory Adapter 6450367	395.00
6450603	1MB SIMM PS/2 70-E61; 121	68.00
6450604	2MB SIMM PS/2 50Z-70	108.00
6450608	2MB SIMM PS/2 70 - A21	128.00
34F2933	4MB SIMM PS/2 55SX; 65SX	279.00
6450375	1MB Mem. BD PS/2 80-041	96.00
6450379	2MB Mem. BD PS/2 80 111-321	158.00

CAT. #	DESCRIPT.	NSI
6451060	4MB Mem. BD PS/2 80-A21-A31	298.00
6450605	2-8MB Xpand Mem. PS/2 70&80 w/2MB	348.00
34F3077	2-14MB Xpand BD. PS/2 70&80 w/2MB	388.00
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4MBx8			259.00	279.00	309.00	
4MBx9			279.00	269.00	299.00	

DRAM CHIPS

	150	120	100	80	70	60
64x1	.90	1.20	1.50			
64x4		2.00	2.15			
256x1	1.25	1.40	1.60	1.85		
256x4		5.00	5.25	5.60	6.25	7.50
1MBx1	4.75	5.00	5.35	6.00	7.00	

COMPAQ MEMORY

CAT. #	DESCRIPTION	NSI
107331-001	512KB Upgrade Portable III	38.00
107332-001	2MB Upgrade Portable III	118.00
107651-001	1MB Module Portable 386	218.00
107653-001	4MB Xpand Mem. Portable 386	630.00
107654-001	4MB Mem. Xtension Portable 386	630.00
108069-001	1MB Xpand Memory DP386-16	288.00
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PC13-PA8306U	2MB Memory Card Portable T1200XE	168.00
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PC15-PA8308U	2MB Memory Card Portable T3100SX	162.00

CAT. #	DESCRIPTION	NSI
PC15-PA8310U	4MB Memory Card Portable T3100SX	378.00
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H33443B	1MB HPLaser Jet II & IID	99.95
H33444B	2MB HPLaser Jet II & IID	139.95
H33445B	4MB HPLaser Jet II & IID	214.95
1039136	1MB IBM Laser 4019	139.00
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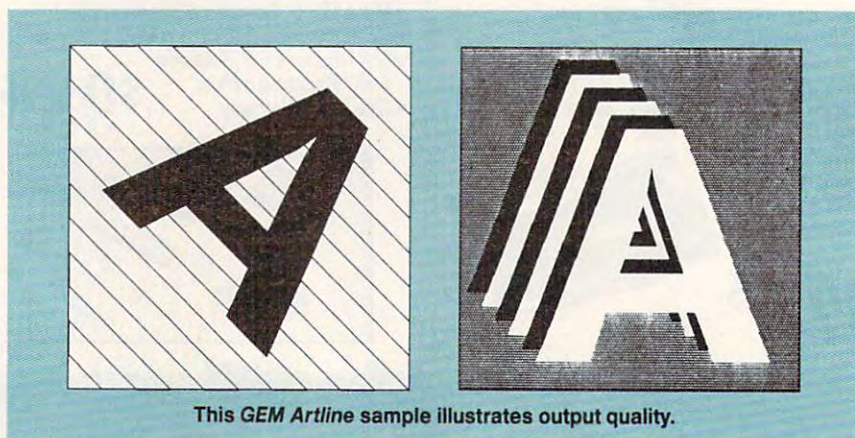
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ed at even higher resolutions (that's one of the great advantages of PostScript-based documents), you have to wonder if your line and character spacing will always match the line and character spacing of a real PostScript printer.

In addition to the question of PostScript printer emulation, there's another potential problem: While this printer comes with 3MB of RAM, that may not be enough for some jobs. The printer's memory holds the text and graphics for the current page and a font cache for each of the soft fonts used for that page. In addition, if you want the printer to print at its rated speed of 12 pages per minute, you'll need to use the 2-page buffer, which uses even more memory. This buffer allows the printer to begin working on the second page of a document while the first page is waiting to be printed.

Taking advantage of all of these features can quickly consume your 3MB, especially if you're printing at the 600 × 300 dpi resolution on legal-size paper. With 600 × 300 dpi,

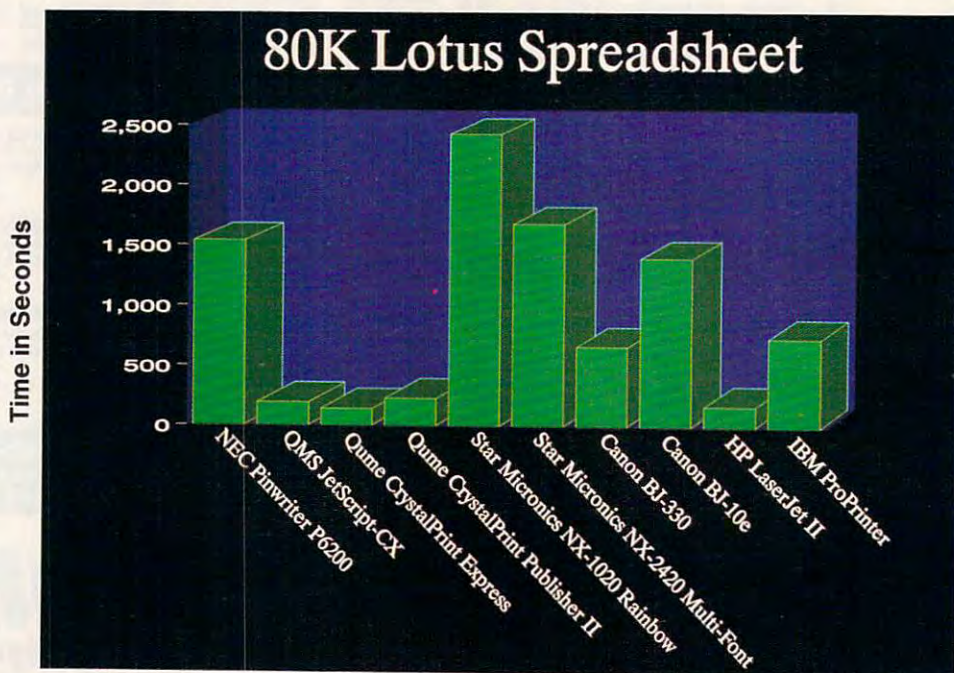


Qume recommends 4MB for legal-size paper without the two-page buffer and 8MB for legal-size paper with the two-page buffer. In general, adding RAM will improve performance and allow you to print more complex images.

Otherwise, I have no reservations about the CrystalPrint Express. It's easily the fastest PostScript printer

I've ever used, the extra resolution makes using scanned photos a real option, and it prints blacks that are solid and dark (not the blotchy grays you find with many laser printers). If you need the extra speed and higher-quality output—and you're willing to shop around for the best price—this printer is definitely worth a serious look. >

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For all-around home office printing, whether text or graphics based, Qume's personal PostScript-compatible printer makes a sizable contribution to your productivity without destroying your bottom line. Its six-page-per-minute speed doesn't really rival the speed of other printers serving this market, but the overall print quality is superior to that of many lower-cost lasers. Add to that the ease with which you can switch from HP emulation to PostScript printing, and you have the makings of a solid performer.

I've experimented with a lot of printers over the last six years, which means I've suffered through countless installation agonies and false starts. The CrystalPrint was no better or worse than most laser printers. You have to handle the drum kit and toner accessories with care and be careful to read all of the instructions. Like most of its cousins, this laser printer could have used a quick installation guide comprised of very clear instructions and plain illustrations. I've yet to discover why so many manufacturers of such complex equipment don't include these guides. Using the owner's manual, I had the printer up and running in a couple of hours, which included skimming the documentation to familiarize myself with the printer's basic operations.

Once online, the CrystalPrint lived up to all of my expectations, and then some. Text printing was clear and quick—I had no problems configuring the system to produce *XyWrite* and *GrandView* text files. Using the HP emulation mode and *Ensemble*, I was able to print graphics and type in a variety of styles and faces with ease. Printing

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Skepticism ran high. "Paul, you promised me an application like that two years ago," said Marge. "You couldn't do it, and neither could that dBASE programmer you hired. It'll never happen!"

I'd already tried three times before to program a database: first with dBASE (much too complicated). Then I tried Q&A (not powerful enough). Then I bought Paradox (just like dBASE). They were all either too complicated, or not capable enough for our needs.

This time, I was confident. Why? Because I just bought Alpha Four, the relational database for non-programmers like me.

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and procedures based on the outline I laid out.

Alpha Four's report writer was even more impressive. I "painted" reports and invoices on-screen. They looked exactly like I wanted them to—much better than our old paper forms. I always ran out of power with other simple-to-use databases; they weren't relational. With Alpha Four, I created different databases for customers, invoices and inventory and then related them into a "set," just by drawing on-screen, a diagram of the links between the databases.

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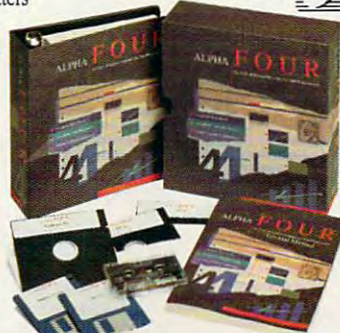
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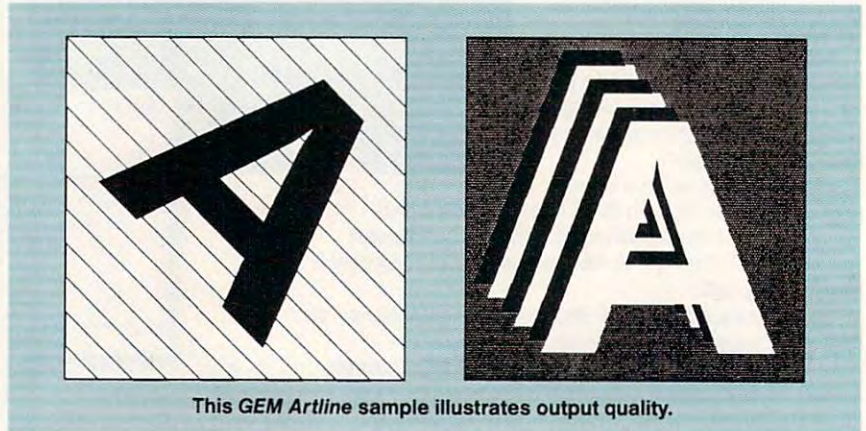
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TAK

benchmarks performed for *COMPUTE*'s Test Lab clocked an 80K *Lotus 1-2-3* spreadsheet at three minutes and 49 seconds.

Switching to PostScript emulation is made easy by means of a front-panel LCD display menu that guides you through a well-designed menu tree. I switched from HP to PostScript on my first try without having to go back to the manual for help. Once in PostScript mode, I printed several designs and layouts composed in *PageMaker* and *CorelDRAW*. The CrystalPrint's output was extremely clear and sharp. A separate Test Lab benchmark rated the speed of PostScript printing at 15 minutes and 6 seconds for a four-page *GEM*-based graphic design. A second design, a two-page *GEM*-based newsletter, was rated at 4 minutes and 43 seconds.

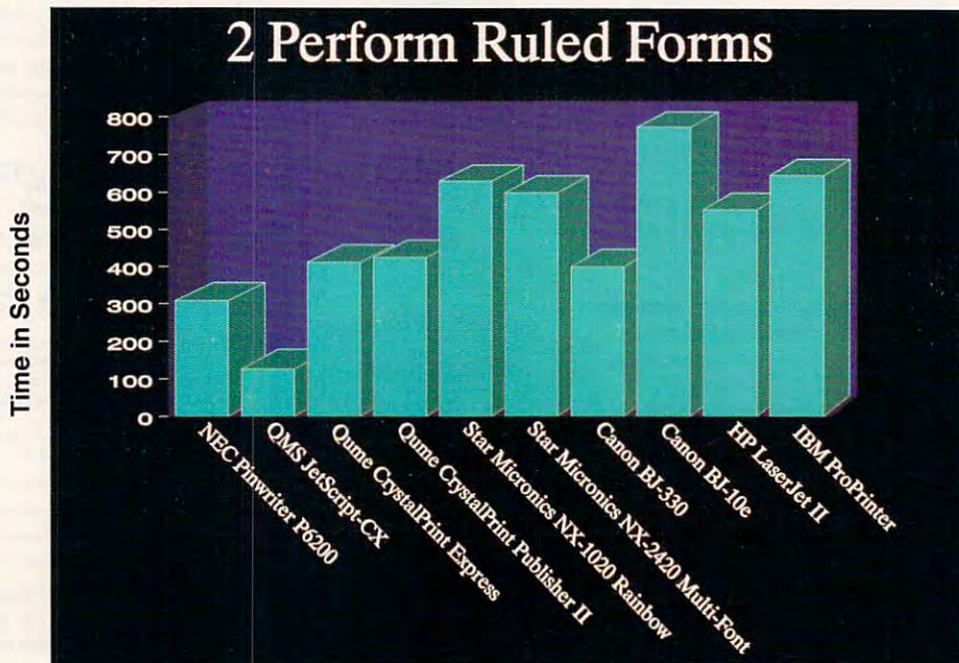
Paper-handling features consist of a single 100-page paper tray and manual feed. The CrystalPrint will handle regular-size paper, as well as legal size, mailing labels, envelopes, and transparencies. It prints in landscape and portrait modes.



This *GEM Artline* sample illustrates output quality.

If your office at home is like mine, you're constantly battling for space. The CrystalPrint is fairly compact for a personal laser printer. I do wish, however, that the engineers had devised a "quiet mode" for times when the printer wasn't in use but was switched on. I found the idle noise level distracting within the confines of my small office.

Still, the CrystalPrint is a welcome addition to the home system of anyone looking for the best in printer output. Not everyone requires PostScript-quality graphics, or even laser-printer quality. But if you do, then this printer's easy versatility and excellent output quality make it a prime candidate for you. ▸
PETER SCISCO



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STAR MICRONICS NX-1020 RAINBOW

Star Micronics' latest Rainbow release is a solid performer at a reasonable cost. The 1020 Rainbow boasts just enough special features, not only to set it apart from other low-cost dot-matrix printers, but also to make it worth considering over certain 24-pin models.

Top on the features list, obviously, is color. Adopting the Epson FX-850 emulation (the standard setup out of the box) allows the Rainbow to use the ZX9CL ribbon to print colorful documents from software that supports color printing. (Star is readying drivers specifically designed for the 1020 Rainbow; a *Windows* driver is already available, if you're using graphics programs in that environment.)

You can easily control color printing from the printer's front panel with the template card that Star provides. The plastic card fits over the control panel and indicates which button to press for selecting various colors. The selections are also documented in the manual, but it's much easier to use the card—keep it in a safe place.

The front panel controls much more than color, however. From here you can also control print modes, fonts, and paper handling. It's this last that makes the 1020 Rainbow worth considering as a low-end printer. The printer's paper-parking and sheet-feeding mechanisms work flawlessly, once the paper is properly loaded.

These features allow you to print single sheets without having to completely unload tractor-fed paper. In addition, the printer handles multi-part forms, which are useful for invoicing and shipping in a home office setting. Tractor-fed paper can be loaded either from the back or the bottom of the printer, giving you further options in placing your printer in the office.

Print quality from the 1020 Rainbow is what you'd expect from a nine-pin dot-matrix printer. From a high-speed draft mode to a Courier typeface in near letter quality (NLQ) mode, your printouts will serve the purposes for which they were designed. Draft mode is very quick and

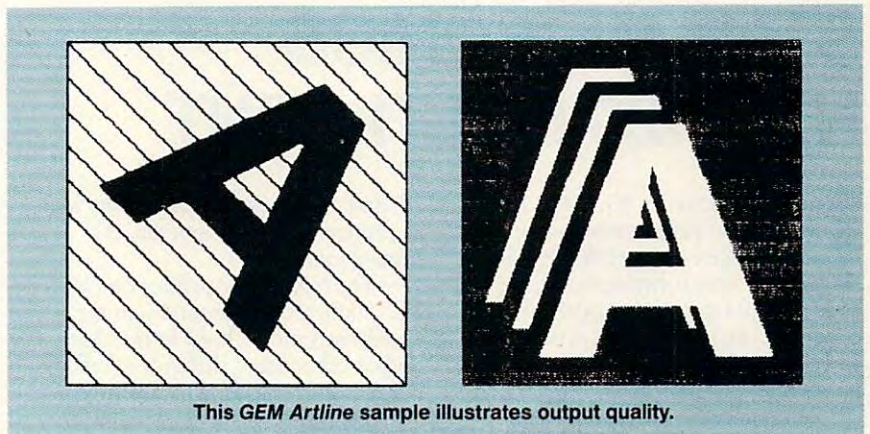


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readable; NLQ in both serif and sans-serif faces is very presentable for short documents; a Script typeface is useful for documents needing a special touch.

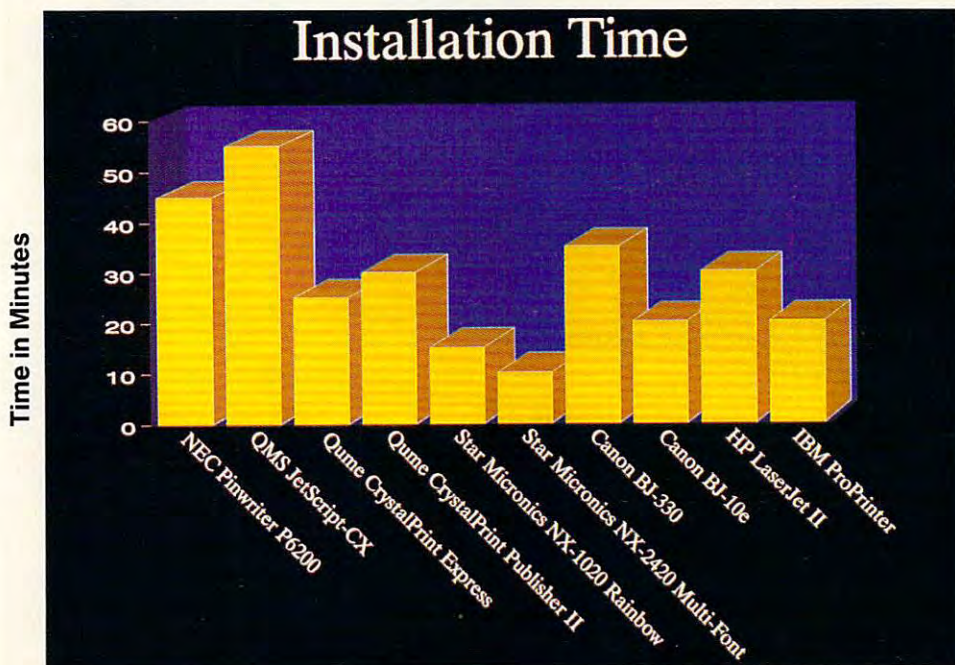
Noise levels at home are a real concern, and impact printers are notorious for their high noise levels during operation. Star has mitigated this effect somewhat with a rounded, ergonomic design that somewhat muffles the machine noise, insofar as the noise level of a nine-pin printer can be muffled. The noise level is not so annoying that it requires you to leave the room when printing, but it will prove distracting during telephone calls.

Star built this printer for the first-time buyer and for home office workers who need a printer with solid paper-handling features at a low price. Both of these groups could do with better documentation than is provided with this printer. The manual is, in many respects, quite complete, and it covers everything from initial setup to external commands that you can send from your computer for advanced functions. There's even a section that



explains how to create your own characters to use with the printer. For all of those excellent qualities, however, the manual assumes, perhaps wrongly, that the user knows a fair amount about printers. A second brief "starter guide" that describes printer setup, paper loading, and front-panel controls in general nontechnical language would be a superb addition to the 1020 Rainbow package.

Designed for low-volume home use, the NX-1020 Rainbow is a solid performer with superb paper-handling features and the added benefit of color printing. If you're in the market for a printer and you want to keep your costs down while maintaining a professional presentation, the Star Micronics NX-1020 Rainbow is an attractive option. ▸
PETER SCISCO



STAR MICRONICS NX-2420 MULTI-FONT

The Star Micronics NX-2420 Multi-Font printer makes a pretty good office companion. This 24-pin dot-matrix printer produces good output from any number of applications, including word processing, spreadsheet, and accounting programs.

With a fresh ribbon, the NX-2420 in letter-quality mode produces fully satisfactory output for most correspondence and for in-house reports. Five letter-quality fonts are provided, and each style offers the usual italic, bold, and large-sized print variations.

In addition, the Star operates at several pitch settings including 10, 12,

15, and 17 characters per inch as well as proportional and condensed proportional.

The NX-2420 operates quickly—222 characters per second—in high-speed draft mode, but I found that output broken and difficult to read. Regular draft mode, which prints at 167 cps, produces more readable documents. Letter-quality output is rated at 55.5 cps.

The NX-2420 is generous in paper-handling options. Single sheets, fanfold paper, and multipart forms of up to five ply all work in this printer. You'll use the friction feed for single sheets, and you can use either rear

loading or bottom loading for continuous forms.

If you use the rear-loading option, paper feeds through the back of the machine into the tractors which push the paper through the paper path. Although this setup affords the convenience of paper parking, so that you can print on single sheets without unloading the fanfold paper, it also produces a higher incidence of paper jams. On the other hand, these jams are only occasional, and the parking feature is a tremendous advantage for an operator who often switches between letterhead and continuous-feed paper. ▶



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Barrington, IL 60010

The bottom-feed option moves the paper around the platen and then into the tractors. In this configuration, the tractors pull the paper through the print path, resulting in a smoother operation. This option is recommended for multipart forms.

The Star's noise level is average, and if you need it, you can take advantage of the printer's quiet mode, which can make working near it more pleasant. However, selecting quiet mode cuts the printing speed significantly.

The front panel houses five buttons for selecting options and defaults. By pressing combinations of these buttons, you select fonts, adjust paper positioning, or change printer settings. The most commonly used functions are labeled on the faceplate, and templates offer guidance for lesser-used functions.

The NX-2420 allows you to select font, pitch, and autoloop settings and record them as a macro that's executed on power-up.

With the NX-2420, you get a 7K buffer and the option to expand your capabilities with either a font cartridge or a RAM cartridge. The printer supports two graphics sets and 16 international character sets.

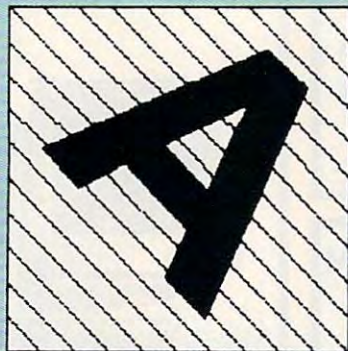
Because the printer emulates either Epson printers or the IBM ProPrinter, it's quite easy to locate drivers appropriate for most applications.

In short, the NX-2420 provides good print quality and plenty of features. It's a printer you can count on to handle a variety of tasks.

TONY ROBERTS

For a full listing of printer features, see the grid on p. 60.

All Benchmark/Performance Testing is conducted by Computer Product Testing Services, Inc. (CPTS), using benchmark software developed by COMPUTE Publications International Ltd. CPTS is an independent testing and evaluation laboratory based in Manasquan, New Jersey. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.



This GEM Artline sample illustrates output quality.

Printer Glossary

dot-matrix printer. A type of impact printer that uses a ribbon and wires to transfer dots of ink onto paper. See also **pin**.

dpi (dots per inch). A standard for printer resolution that measures the number of dots a printer can place along a linear inch. Laser printers are typically rated at 300 dpi.

draft quality. The lowest print-quality setting of a printer. Because the printer puts less ink on the page, this is usually the fastest print mode. Most often associated with dot-matrix printers.

emulation. The ability of a printer to mimic the functions of a similar, but incompatible, printer. Many printers contain the code to emulate one or more standard printers, such as an Epson FX-80, a Hewlett-Packard LaserJet, or an Apple LaserWriter Plus.

font. A printer typeface or family of typefaces. Each font has a particular design but may include different styles and sizes. Most higher-resolution printers allow a choice of font.

ink-jet printer. A type of printer that uses a mechanism that sprays ink onto paper.

laser printer. A type of printer that uses the electrophotographic method used in copy machines. Laser printers print an entire page at a time.

near letter quality. Print quality that approaches the quality of a standard office typewriter. Abbreviated **NLQ**.

near-typeset quality. Print quality that approaches the quality of a typesetting printer.

pin. One of a series of pins located in the printhead of a dot-matrix printer. Each pin produces a dot at a specified location on a printed line of text. See also **dot-matrix printer**.

print driver. A device driver that converts a program's generic printer output into the codes required by a specific printer.

printer buffer. A hardware- or software-based memory device that accepts printer data from a computer and holds it until the printer is ready for it—thus freeing the computer for other use. The process of using a print buffer is often referred to as **print spooling**.

sheet feed. A mechanism that moves single sheets of paper through a printer. See also **tractor feed**.

tractor feed. A mechanism that moves continuous paper through a printer. The paper must have prepunched sprocket holes on both the left and right sides. Also known as **pin feed**. See also **sheet feed**.

—DAVID ENGLISH

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Comparison of Printer Features

	Canon BJ-10e	Canon BJ-330	Fujitsu DL4600	NEC Pinwriter P6200	The Printer Works JetScript-CX	Qume CrystalPrint Express	Qume CrystalPrint Publisher II	Star Micronics NX-1020 Rainbow	Star Micronics NX-2420 Multi-Font
WARRANTY	1 year	1 year	1 year	1 year	1 year new, 90 days refurbished	90 days on-site, 1 year return-to-depot	90 days on-site, 1 year return-to-depot	2 years	2 years
HEIGHT	1.9"	5.4"	7.5"	8.25"	11.4"	13.4"	9.1"	5.3"	6.1"
WIDTH	12.25"	23.3"	22.9"	17.3"	18.7"	16.6"	15.7"	17.3"	18.2"
DEPTH	8.5"	13.7"	15.2"	14.2"	16.3"	17.8"	13.4"	13.1"	14"
WEIGHT	4 lbs.	19.4 lbs.	39.7 lbs.	23 lbs.	55 lbs.	75 lbs.	35.2 lbs.	13.9 lbs.	14.6 lbs.
PRINT COLOR	b&w	b&w	b&w/color	b&w/color	b&w	b&w	b&w	b&w/color	b&w
PRINT MECHANISM	bubble jet	bubble jet	matrix	matrix	laser	laser	liquid crystal shutter	matrix	matrix
PRINT SPEED	LQ/economy 83 cps	HS draft 300 cps, LQ 150 cps	HS draft 333/400 cps (10/12 cpi), draft 222/266 cps (10/12 cpi), LQ 111/133 cps (10/12 cpi)	HS draft 300 cps, draft 200 cps, LQ 150 cps	8.1 PPM	12 PPM	6 PPM	HS draft 225 cps, draft 180 cps, NLQ 45 cps	HS draft 222 cps, draft 200 cps, LQ 67 cps
INTERFACE									
Parallel	●	●	●	●	○	●	●	●	●
Serial	○	●	●	●	○	●	●	●	●
PostScript	○	○	○	○	●	●	●	○	○
SCSI	○	○	○	○	○	○	○	○	○
AppleTalk	○	○	○	○	○	●	●	○	○
EMULATIONS	IBM ProPrinter, Bubble Jet 130e	IBM ProPrinter XL24E, Epson LQ-1050	IBM ProPrinter XL24, Epson LQ-2500, Fujitsu DPL24C+	Epson LQ, NEC Pinwriter, IBM X24E/XL24E	PostScript	HP-PCL4, PostScript	HP-PCL4, PostScript	IBM ProPrinter III, Epson FX-850/EX 800	IBM ProPrinter X24E, Epson LQ-860
BUFFER/STANDARD RAM	37K	30K	256K	80K	3MB	3MB	3MB	16K	7K
RAM EXPANSION CAPABILITIES	n/a	n/a	n/a	n/a	n/a	to 8MB	to 6MB	n/a	39K
RESOLUTION (DPI)	economy 180 × 360, HQ 360 × 360	360 × 360	360 × 360	360 × 360	300 × 300	standard 300 × 300, enhanced 600 × 300	300 × 300	216 × 240	360 × 360
NUMBER OF INTERNAL FONTS	2	3	5	8	35	31 HP, 39 PS	31 HP, 39 PS	6	7
FONT CARDS/CARTRIDGES	n/a	4	7	8	n/a	n/a	n/a	n/a	4
PAPER HANDLING									
Tractor push	○	●	●	●	○	○	○	●	●
Tractor pull	○	○	●	●	○	○	○	●	●
Friction sheets	●	●	●	●	●	●	●	●	●
Trays	○	○	○	○	●	●	●	○	○
Sheet feeding	●	●	●	●	●	●	●	●	●
Envelopes	●	●	●	●	●	●	●	●	●
Labels	○	○	●	●	●	●	●	●	●

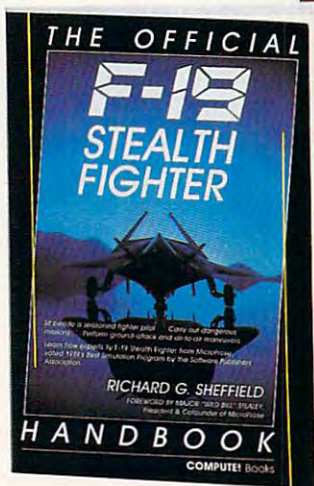
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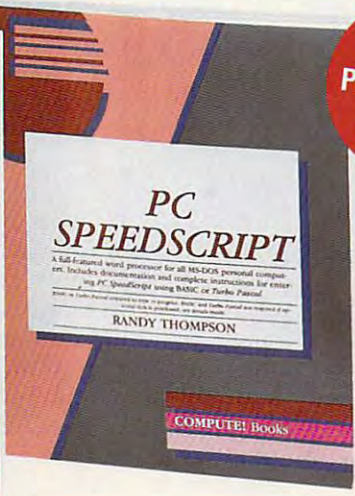
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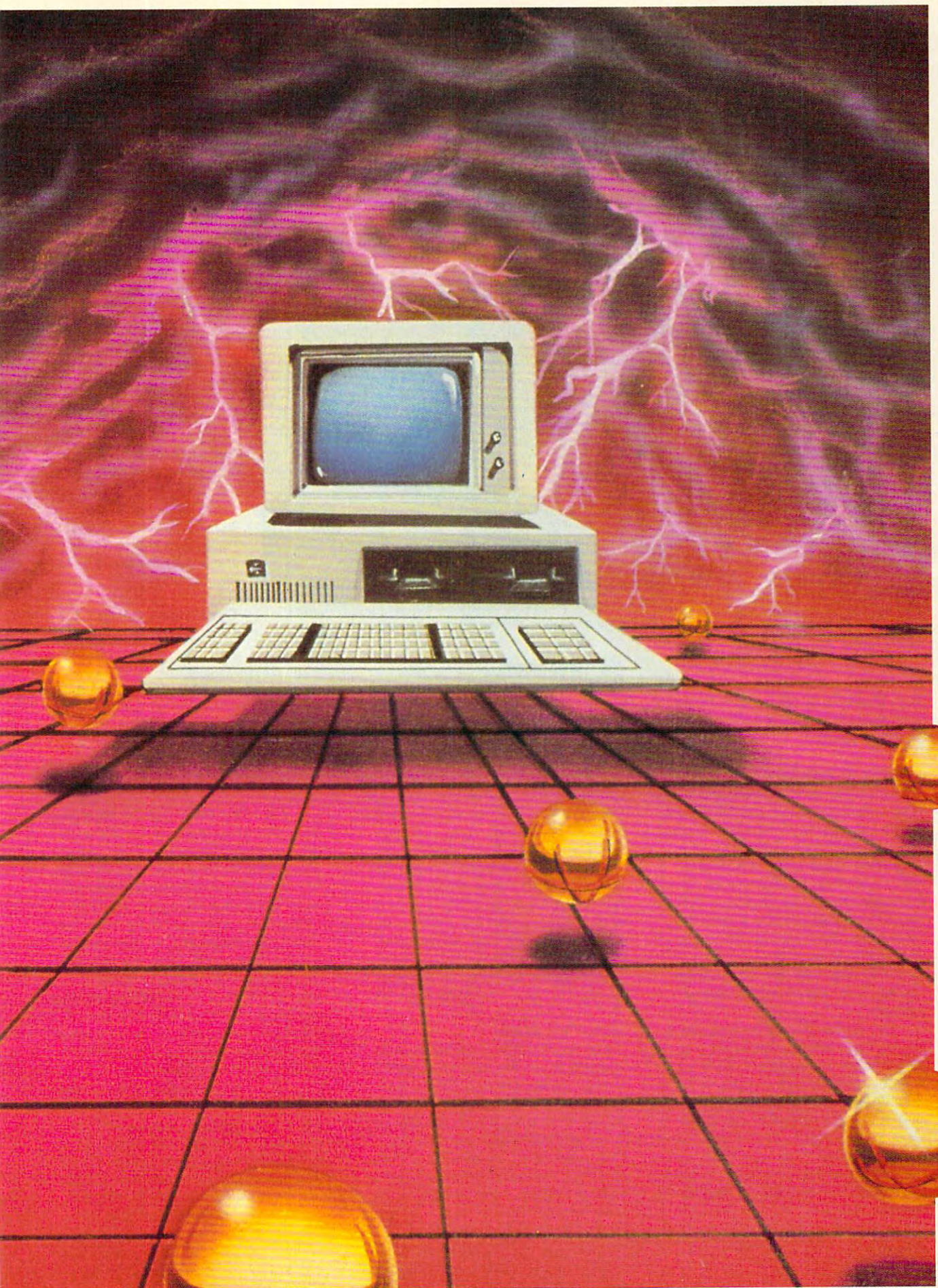
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Someday, you'll be able to afford a zip-bam-boom desktop supercomputer, but not today. Don't take your frustrations out on your home computer. It was great in its day, and, more importantly, there's a lot you can do to put some more bang into the old machine. It may even be possible to make it the equal of a top-of-the-line machine, because there are plenty of inexpensive ways to get the most out of your PC today. ▸

STEVEN J. VAUGHAN-NICHOLS



Hard Decisions

Let's start with your hard disk. What's that you say? You don't have one? A hard disk is easily the biggest performance booster you can get for any MS-DOS-based machine. Many modern-day programs absolutely require one.

Choosing a hard disk isn't easy. There are hundreds of different models for sale, but there are a few things that you should look for when shopping around. The first is a good warranty. It doesn't matter how fast the hard disk is if all it does is sit and blink its lights at you. Second, if you own an AT or a fast XT (10-MHz or better), you're best off getting a drive with an access time of 28 milliseconds or less. Slower machines can get by with 40-millisecond drives. It's easy to make recommendations about how big a drive to get: Buy the largest hard disk you can afford.

No matter how many megabytes of storage you get, you'll run out. Everyone does. So you might as well put off that day as long as you can. The problem is that even if you're good about trashing old files, disk space is grabbed up by fat modern software. You can easily fill a 20MB hard disk with no more than three or four of today's heavy-weight programs.

Double Your Drives

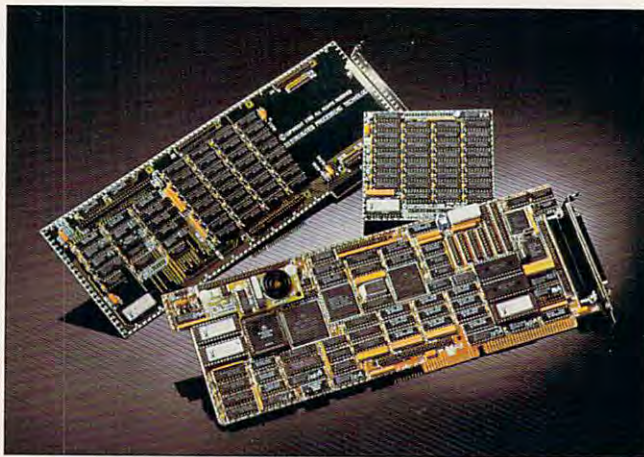
If you already have a hard drive, think about adding another one. Most computers can handle two drives without any problems. For that matter, you may want to think about replacing your current drive. Newer hard drives are bigger, faster, and cheaper than their immediate ancestors. Check with a knowledgeable friend or a technician before putting your dollars down, but the odds are that you can dramatically improve your storage capacity.

If you don't know the first thing about your computer's insides, you may hesitate to install a hard drive. It's not a difficult job, but if you're like me and can't remember which end of the screwdriver to use some days, you may be better off going with another option. That other path is to add a hard card to your system. These cost more than hard drives, but almost anyone can install them. All that's usually required is for you to find an empty slot in your PC and push in the card.

Plus Development makes my fa-

vorite hard cards. They're more expensive than some of the others, but they're great performers. Their two main cards are the Hardcard II 40 and 80. Respectively, they hold 40MB and 80MB of data. They can access this information at speeds well below 28 milliseconds.

Another advantage of these cards is that they'll take up only one slot in your computer. Many hard-card companies claim that their cards use only a single slot, but the large size of their disk compartment makes that debatable.



Any AT-compatible system with an ESDI, MFM, or RLL hard drive will get a jet-assisted boost with this controller.

Main Squeeze

If a second drive is beyond your budget or your computer's capabilities, there's a way to squeeze more information into the same old disk real estate: data compression.

There are two ways of using data compression to get more room on your disk. The first is to use a program like *PKZIP*. This is a shareware program that's widely available on online services and bulletin board systems. If you don't have access to a modem, you're not out of luck. There are several companies that will sell you disks containing *PKZIP* and similar programs. You'll still have to pay their makers if you decide to use the programs, but they're quite inexpensive.

How They Work

These programs work by taking your files and encoding them in a space-saving format. Usually, *PKZIP* will shrink a file down to about 50-66 percent of its original size. It'll work even better on database files and spreadsheets. You can't use these files while they're in their mashed-down state, but it only takes a few seconds to restore them to full size when you need them. These programs are ideal for storing away old files that you may need someday or even software packages which you don't access every day.

There is only one real problem with data-compression programs; they're a pain in the neck to use. You don't have to be a computer wizard to use them, but it doesn't hurt! Fortunately, there are several applications that tame compression software for home use. Two excellent examples, which are also available online, are *SHEZ* and *ArcMaster*.

There's an even easier, faster way of crunching information into smaller packets now coming onto the market. Boards and disks with dedicated data-compression chips will soon appear on store shelves. These will enable you to pack into your disks half again as much information as you can now store. This isn't the first time that those claims have been made, but previous products didn't live up to expectations. This new generation of data-compression chips, from InfoChip Systems and Stac Electronics, should make the promise of fast, transparent data compression a reality.

Cache and Carry

Getting more storage is only part of the hard disk

story. If you're like most users, you want more speed. Nothing is more boring than sitting around waiting for an application to load. There are two ways to improve this situation. The first is to use a disk cache. Any hard disk will act like a hot rod with a cache.

Let's face it—no matter what you do with a disk, you're still stuck with moving parts. There's no way a mechanical subsystem can compete with electrons coursing through doped silicon. Caches put frequently used information into memory, where it can be found in a fraction of the time it takes to find it on a disk. How much of an improvement do you get? In tests over the years, I've found that caching with disk-intensive programs like database managers cuts the time spent reading and writing to disk by 90 percent. Can you say *vroom?*

There are two basic ways you can add caching to your computer. If money is no object, you can take the expensive route and add a caching drive controller to your system. These controllers not only take care of managing your hard drive, but their dedicated RAM holds frequently used data for superquick access. Caching controllers can really give your tired old drive a rocket boost, but their speed comes at a price. >

The SmartCache controller from Distributed Processing Technology is an excellent example of its kind. This full-length card comes with 512K of memory. Any AT-compatible system with the common ESDI, MFM, or RLL hard drives will get a jet-assisted performance boost with this controller. Programs like *dBase IV* that usually seem to take forever to load will leap onto the screen. If half a megabyte of cache isn't enough, you can attach 2MB or 4MB daughter-cards to the main card. With that much additional RAM, even notorious disk slowpokes like *Windows 3.0* will snap to attention on your monitor. So why not run out and get one today? Many users will find the price tag of \$1,230 a mite steep for their tastes.

Because of their price, caching controllers may only appear in business offices. Don't despair; there is a way to get almost the same benefits at home with software caching.

The best thing about software caching is that you already have some basic caching tools in DOS. The `BUFFERS` parameter (in your `CONFIG.SYS` file) stores data in 512-byte chunks. If you set buffers to 10 (`BUFFERS=10`), for instance, you'll have a small cache of 5K.

If you have MS-DOS 3.3 or above, you can get a boost from another free goody: `FAST-OPEN`. This denizen of `CONFIG.SYS` stores the location of your most recently visited directories in RAM. By doing this, changing directories goes faster. The increase is small, but it is there.

While the DOS commands have the sterling virtue of being essentially free, commercial caching programs are much better at improving your disk input/output. I have two favorites here: Multisoft's *Super PC-Kwik* and Golden Bow's *Vcache*. Both will happily use any kind of memory you have: expanded, extended, or (if you *have to*) conventional. Both are easy to use and get really high-octane speeds from your drive. The only thing you need to be concerned about is that they use up at least a little of your 640K of conventional memory. It's a small price to pay for the gains they provide.

Golden RAM

Another way to put some bang into your old machine is to use a RAM disk. This is simply using a program (most MS-DOS variations come with

one named either `VDISK.SYS` or `RAMDRIVE.SYS`) to set aside a chunk of memory to act like a disk drive. This is different from a cache in that a cache just speeds up data moving to and from a hard disk. In a RAM disk all the information is kept in high-speed RAM as if it were on a disk. You wouldn't want to keep an important spreadsheet in one, since an accidentally pulled plug or a momentary power failure would mean the end for them. What you can do is put application programs—or at least parts of them—into the RAM disk.

Take for instance that old warhorse of a word processor, *WordStar*. Like many other programs, early versions of *WordStar* came in several parts, including the main program and what are called *overlay files*.



This full-size card comes with 2MB of RAM, an easy-to-use installation program, and excellent technical support.

Overlays contain routines that aren't used as often as the heart of the software. To save memory, these procedures are left on disk until they're needed. By placing these files in a RAM disk, you can speed up *WordStar* by as much as 200–300 percent. Many other programs will show similar increases from the same treatment.

If you have room for a truly large RAM disk (several megabytes), you can load entire programs into RAM. *Quattro Pro*, Borland's popular spreadsheet, performs phenomenally when used in this way. If you've never used one, you can't appreciate how much faster a RAM disk makes things go. It's like the difference between a dump truck and an Indy 500 racecar.

Elephantine Memory

Of course, while software caching and RAM disks are wonderful things, there is this one tiny problem. They all require more RAM. One straightforward way of improving your system is to add more memory. As I write this, in late February 1991, RAM prices are down to \$50 a megabyte. Prices will probably continue to

drop. One of the best ways to get more out of your PC is to add memory. You can't afford not to do it.

Adding memory chips can be tricky, so you may want to call in professional help. Some systems won't accept additional memory or will only take a small amount.

Memory chips are packaged in four different ways: Single In-line Memory Modules (SIMMs), just the chips themselves (usually called DRAMs for Dynamic Read Access Memory), Single In-line Pin Packages (SIPs), and Dual In-line Pins (DIPs). Chances are about 999 to 1 that your PC can use only one of these forms of RAM. The others would be worthless to you. You also need to be certain to buy only memory of the same capacity and speed. It's sometimes possible

to mix, say, 256Kb (kilobit) and 1Mb (megabit) chips or 80ns (nanosecond, access time of billionths of a second) and 100ns chips on the same motherboard, but that's a game that only professionals should play.

RAM added to the motherboard is generally set up as extended memory. Extended memory can only be used with the 80286 and later CPUs. Another option is expanded memory. Their names are similar enough to confuse most nontechnical people. The 80286 and its newer cousins can access many

megabytes directly, eliminating the concept of conventional RAM and the 640K barrier. Older CPUs must use special techniques to move information between conventional RAM and added RAM. Expanded memory swaps a certain section of conventional RAM with expanded RAM. This technique was wildly popular when it first emerged, but with many users turning away from the 8088 and 8086 machines and embracing the more advanced CPUs, expanded memory is declining in popularity, and extended memory is in ascendance.

Expanded memory is one way to quickly and simply add memory to a system without sweating over memory chips. Expanded memory is sold on expansion cards that you can buy already populated with RAM. Normally, these cards support LIM 4.0 expanded memory. This kind of memory is used by many popular programs like *Lotus 1-2-3* and *DESQview*.

Even if you need to add RAM to an expansion card, it's usually much easier to add chips to one of them than to your motherboard. After all, you can set the card down in a posi-

tion that's well lighted and comfortable. Unless you feel confident enough to tear your machine apart, that's more than you can do with the motherboard.

I've used several of these cards over the years. The clear winner has been Intel's Above Board Plus 8 I/O with 2MB. It's a mouthful of a name, but it's a heck of a board. This full-size gem of a card comes with 2MB of RAM, an easy-to-use software installation program, and excellent technical support. When you're working interfaces like *Windows 3.0* to their limits, you can add up to another 12MB to the board.

You may be able to get more memory out of the system you already have. Sound incredible? It is incredible, but it does work. DOS is a rather messy operating system, and it doesn't take full advantage of the memory in your system. Programs like Quarterdeck's *QRAM* for 8088 and 80286 machines and *QEMM* for 386 machines can liberate almost 100K of memory for direct use by programs. These programs, and others like them, won't always work. That's because not every machine's architecture has hidden memory treasures. If you're willing to live without programs that use graphics, these programs can almost always let you grab an additional 96K of RAM.

The Tsars of TSRs

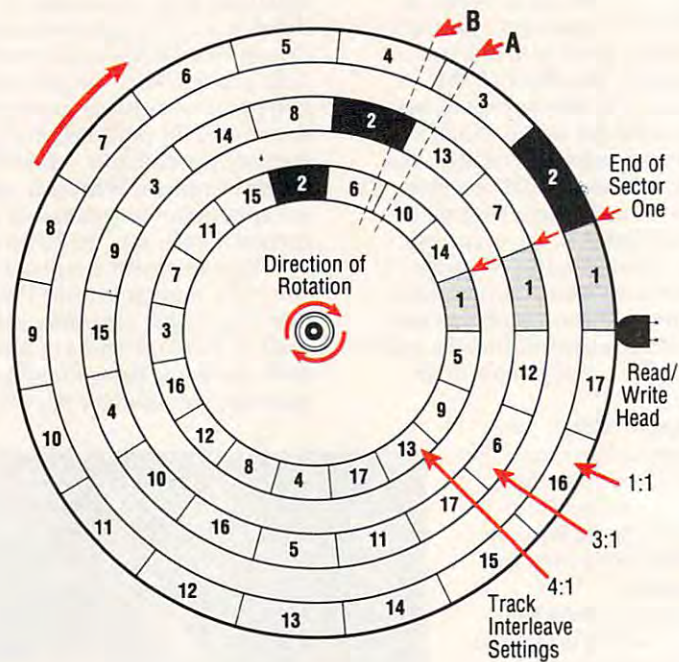
If you're feeling severe RAM cram from overly plump programs and a surfeit of terminate-and-stay-resident (TSR) programs, *Mark and Release* (part of a freeware package from TurboPower known as *TSR Utilities*) are two programs that let you rein in out-of-control TSRs.

The programs work in tandem. *Mark* loads TSRs into memory, and *Release* takes them out of memory when you need every last K you can get. It's not as nice as having additional memory, but it is the next best thing. The most attractive thing about this powerful pair is the price. You can download and use this utility package at no charge or purchase it from TurboPower for \$20.

Boards and Chips

If you're a spreadsheet fan or you use serious graphics software, you can help yourself by adding a math coprocessor. These specialized chips can do in a flash the heavy math that bogs down any CPU (except the 80486). There are many different math coprocessors, but you will want to be sure that yours is completely compatible with your software. For that reason, it's best to ignore price advantages and stick with the Intel

Interleave Made Easy



There's one performance boost that's almost free—adjusting your disk's interleave. Interleaving is a method of storing data on a hard disk that, if set up correctly, results in faster, more efficient transfer of information between computer and disk. To check (and possibly change) your disk's interleave, you can use *Interleave Adjustment Utility*, found on this issue's *PC Disk*. To understand how interleave affects performance, read on.

A disk's interleave, which is expressed as a ratio, is an indication of how much data can be read and transferred from disk to CPU in relation to how far the disk has rotated.

An interleave of 1:1 indicates that one sector is read and transferred for each sector that passes under the drive's read/write head. This is the ideal setting, resulting in the fastest transfer of data. The accompanying graphic illustrates this arrangement by showing data written sequentially on each of the disk's 17 sectors.

However, not all disk/controller/CPU combinations can operate at such a rate. During the time it takes to read and transfer the data in the first sector, the second sector already may have passed the read/write head. Further data transfer is halted until the disk has made a complete rotation and the second sector appears again under the read/write head. Admittedly, this is a small delay since the typical hard disk rotates 60 times a second, but in a computer where time is measured in milliseconds and nanoseconds, it's a costly wait.

To avoid such problems, disks can be set up with varying interleaves. In such cases, as the graphic shows, data is not stored sequentially on the hard disk. One sector is filled; then one or more sectors

are skipped before the next segment of data is written.

With a 2:1 interleave, for example, two sectors pass under the read/write head for each sector read. A full 17 sectors can be read with two rotations of the disk. In a slower system, using a 3:1 interleave, sequential data is stored in every third sector.

A hard disk's interleave is programmed in during low-level formatting, which puts down the markers that the operating system uses to keep track of stored data. In many cases, the interleave is set too high in a kind of conservatism. If a mistake is made, err on the high side rather than the low.

As shown above, the penalty for too low an interleave is that the system must wait one full disk rotation between sector reads. On the other hand, setting the interleave to 3:1 on a system that could handle 1:1 is not as serious. In this case, the controller simply passes over two sectors that it could've read before finding and reading the next sector in the data sequence.

Computer systems built today generally are fast enough to handle 1:1 interleaves, but not all hard disks are formatted that way. If you're concerned that your hard disk isn't transferring information as efficiently as it could, investigate disk-utility software that can analyze and change disk interleaves.

These programs run a series of tests to determine the optimum interleave; then the program reads each disk track into memory, reformats that track with the new interleave, and returns the data to the hard disk in the new, more efficient arrangement. Reinterleaving this way can dramatically improve performance, but for safety, back up your hard disk before you begin.

— TONY ROBERTS

80287, if you have an 80286, or the 80387, if you have an 80386 under the hood.

Math coprocessor prices range from \$142 for a 5-MHz 8087 to \$994 for a 33-MHz 80387DX. Generally, you need a coprocessor that has a designation matching your CPU (such as the 8087 coprocessor for the 8088 CPU) and that operates at the same speed as your main processor.

Now and then you may become so frustrated with your old PC that you may be tempted to replace the motherboard. Don't fall prey to that temptation. I've had several friends try this, and they always ran into a host of problems. Most typically, they came face to face with extremely odd compatibility problems that no one had ever seen before. They were not happy campers.

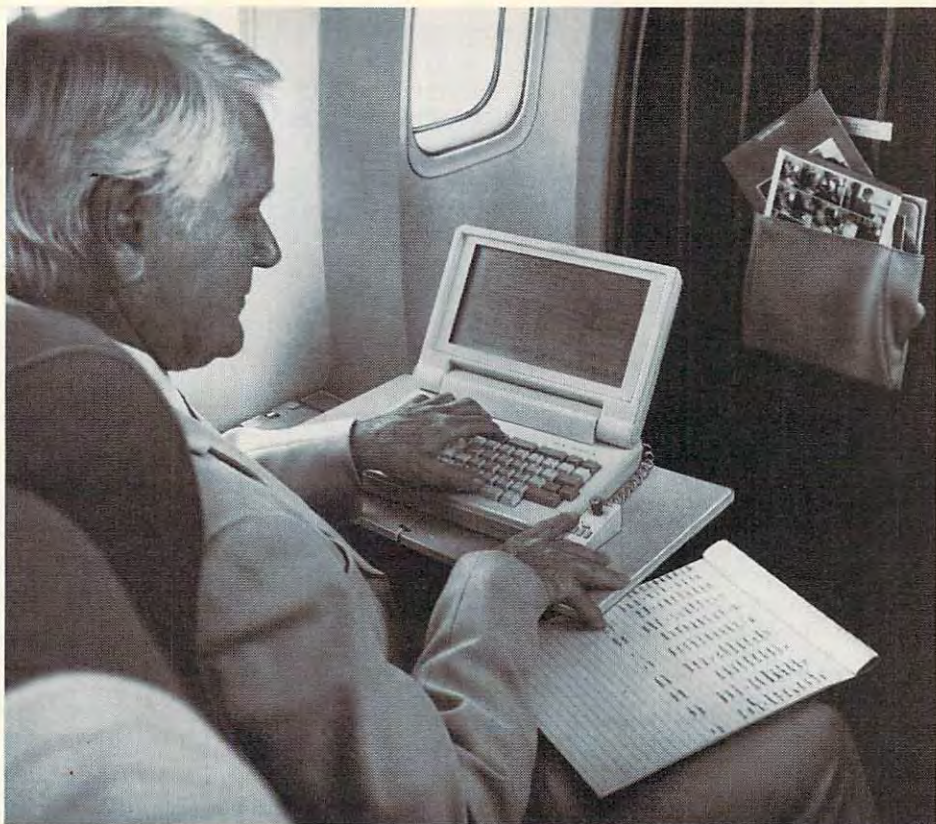
If you're an electronics hobbyist, go ahead and give it a try. Just don't do it expecting to realize big performance gains. You're probably not going to get them. If you're still inclined to try, think about building a computer from pieces instead. You'll have the same kind of fun and a much better chance of having a fast PC when the soldering iron and screwdrivers are put away.

A less drastic alternative is to replace your main processor. There are several accelerator cards that can turn humdrum PCs into tigers. Some of the most popular ones are supplied by Intel: the Inboard series.

Intel has a full range of 80386 boards. The main two are the Inboard 386/AT for AT compatibles and the Inboard 386/PC for PCs, XTs, and XT compatibles. The 386/AT also can be bought with installation kits for the hard-to-fit Tandy and Compaq AT compatibles. These boards replace an AT's 80286 or an older machine's 8088 with a 16-MHz 80386 chip. This won't give you a dramatic boost if you're replacing a modern 12.5-MHz 286, but it will give your system a real kick in the pants if your CPU runs at 10 MHz or less. Installing these boards requires some finesse, but electronics handymen won't find it too much of a problem. You can use the same boards to add an 80387SX to a system, if you need more number-crunching power.

Staying in the Race

As you have seen, there are many ways to put your PC back into the thick of the computer race. Some of them are quite pricey, while others won't cost you a dime. The moral of the story is simple: Not only can you teach an old dog new tricks, but armed with the right tools, you can even make him jump through hoops.▷



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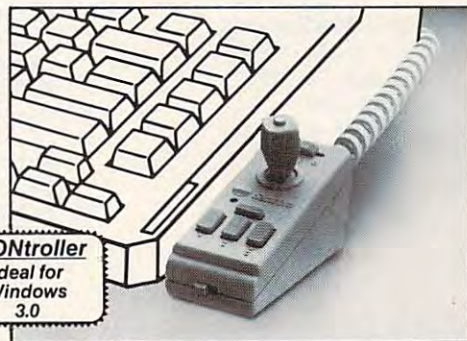
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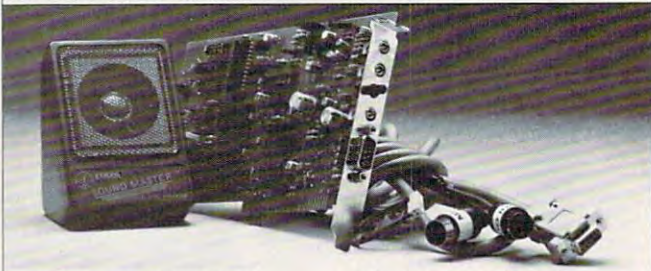
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Performance Shop

Now you know what to do to get the most out of your PC, but where can you find what you need? Most of the products are available through mail order or (if freeware or shareware) on most bulletin boards and commercial online services. List prices are given, but commercial products are frequently discounted. One additional point about shareware needs to be stressed: To ensure the steady flow of high-quality shareware, always register and pay your registration fee.

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ON DISK

T O N Y R O B E R T S

Power users and novices, unite! Here are several super utilities that let you test your system's performance. You can do anything from repairing a disk's file allocation tables to restoring the CMOS memory to your system setup. You can even use these programs to test your floppies to see if there are any system, data, or file errors.

Quick Filer

You'll do a double take when you run this high-quality file-management utility. *Quick Filer* can display two sorted disk directories at the same time; copy, move, and delete files; rename files and directories; view text files with your favorite text lister or editor; and run applications within *Quick Filer*. You can even view, extract, or create archive files utilizing one of the more common archive utilities.

It's one of the few DOS shells with full mouse and EGA/VGA display support. The author is Kenn Flee of Jamestown Software in Madison, Wisconsin, who requests a \$20 registration fee.

The program is designed to work on any IBM or compatible PC with DOS 2.1 or higher; however, DOS 3.0 or higher is preferable, since some of the options depend on the presence of DOS 3.0 enhancements. You'll need at least 256K of RAM plus additional memory to run applications from within *Quick Filer*.

GoFile

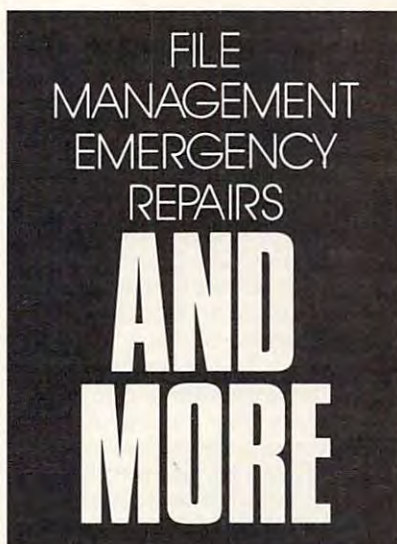
With *GoFile* it doesn't matter if you remember the exact spelling of the filename or directory that you're looking for as long as you remember part of it. Once *GoFile* finds the file or directory, it either takes you there or gives you a list of all the matches, whichever you prefer.

The utility was written by Justin Langseth of Warwick, Rhode Island. It's a shareware program, and the author has set the registration fee at \$15. *GoFile* runs on any IBM or compatible PC with DOS 2.1 or higher.

The Command Line Utilities

For those dyed-in-the-wool command line practitioners, here's a collection of handy utilities written by Erik Skamser of Digital Data Systems that makes issuing DOS commands a little easier.

Two of the utilities, *Move* and *Movesafe*, do what DOS should have done from the beginning; they copy files from one location to another and then delete the original files.



Anyone who uses one or more archiving utilities will appreciate *Extract*. This small but useful utility supports all of the familiar archive formats, such as ARC, ZIP, PAK, SDA, SDN, DWC, LZH, and ZOO. *Extract* knows which compression utility to use to extract the archive file. Of course, the compression utility must be available in the current directory or in a directory specified in your PATH.

The Command Line Utilities requires an IBM or compatible PC with 256K of RAM and DOS 2.1 or higher. The registration fee for the complete package is only \$5. The author also offers a disk with the most recent version of all the supported archive utilities for an additional \$2.

CMOS

The next time your system won't boot because your CMOS setup information has been trashed or your battery has been disconnected, *CMOS* can save the day. This tiny utility saves a copy of CMOS memory to a file or restores the information in the CMOS memory from a disk file. This can be used to quickly restore the configuration of your machine without your having to remember the pertinent information contained in CMOS.

This public domain utility was written by Alan D. Jones of Farpoint Software in League City, Texas. There's no registration fee, but the author does offer several shareware utilities including *DiskDup* (a disk-duplication program), *DiskEmu* (a DISKCOPY emulator), *TPW* (a password security program), *EPW* (a file-encryption utility), and more. The author requests a small registration fee of \$25 for these utilities.

You'll need an IBM or compatible computer, DOS 2.1 or higher, and 256K of RAM to run the program.

FatFix

Don't spend your hard-earned money for a commercial program that fixes the FAT on a trashed disk until you've tried *FatFix—File Allocation Table Manipulation*, a handy utility included on this month's disk. The program was written by Michael A. Hotz of Techniform Industries in Fremont, Ohio.

Working with disks at the sector level is dangerous, especially when dealing with the organizational structures. This program works in two ways. The first option lets *FatFix* repair file allocation tables by letting you copy one FAT to the other and allowing you to create a backup file first. The second option lets you restore the FAT of a disk from a backup file if the program doesn't work as you expected or makes matters worse.

As always, it's best to try this type of program on a floppy disk first. It's nice to know there's a way to repair a

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disk if it gets trashed, but the rule of thumb is always to make a backup of your disks, especially your hard drive. Then if the fix-it program doesn't work, you can reformat and still restore your data. The program requires an IBM or compatible PC, DOS 2.1 or higher, and 256K of RAM.

Interleave Adjustment Utility

Does your computer measure up? Let *IAU* (*Interleave Adjustment Utility*) check the speed of your hard drive and adjust the disk's interleave if it's not working up to its full potential. The program works with most RLL, ESDI, and SCSI drives.

IAU performs a low-level format on the hard drive to adjust the interleave.

The author of *IAU* is Dave Bushong of Dracut, Massachusetts. The program runs on any IBM or compatible PC with a hard drive (it may not work on some hard cards), DOS 2.1 or higher, and 256K of RAM.

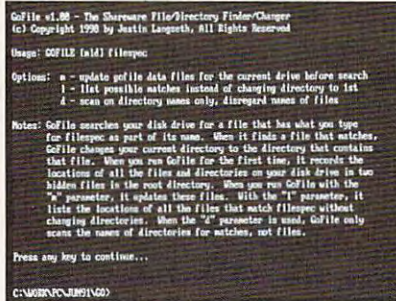
Equiplist and DiskTst

Need system statistics or bad disk sector information? Try *Equiplist* and *DiskTst*, two utilities from *COMPUTE's Productivity Manager* disk. They're yours free of charge. If you'd like to receive 37 more useful utilities and batch-file extensions, you can order the *Productivity Manager* from our Greensboro, North Carolina, address for \$14.95 for the 5¼-inch disk or \$15.95 for the 3½-inch disk. (See the *COMPUTE's Disk Products* ad in the Information and Extras menu option when you run *COMPUTE's Menu Operating System* on the disk.)

Equiplist is a tiny utility that displays your computer's system information, including the CPU type and speed, number and type of installed floppy drives and hard drives, installed mouse driver, number of serial and parallel ports, amount of used and available memory, type of monitor, and more.

With *DiskTst*, you never have to waste your time copying files to damaged disks again. The program checks for damage in the system and data areas. Then it checks for disk errors where each file is located.

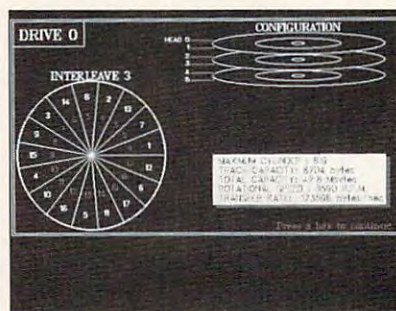
The programs run on any IBM or compatible PC (*Equiplist* may not work on some Tandys) with DOS 2.1 or higher and 256K of RAM.



GoFile

FILE	DIR	DIR	FILE	DIR	DIR	FILE	DIR	DIR
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Quick Filer



Interleave Adjustment Utility



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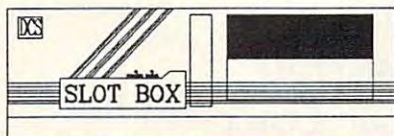
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TIPS & TOOLS

H I N T S A N D T I P S F R O M O U R R E A D E R S

When using *PageMaker* for the PC, most users know they can view their work at 200-percent size by selecting 200% from the Page menu or by pressing Ctrl-2. Since there's no menu option for 400 percent, most users don't realize that a 400-percent view is available. Try pressing Shift-Ctrl-2 to really zoom in on the fine points of your document.

*Tony Roberts
Greensboro, NC*

Viral Warfare

Many folks are worried about viruses these days (the computer variety, not the common cold). Here's a tip that'll keep some of the bad guys away.

Most viruses inhabit programs (COM and EXE files). They reside on an area of the disk called the boot sector. Of the five most common viruses in North America, three are boot-sector infectors.

The only way you can catch a boot-infecting virus is to boot from an infected disk. You can't get it from a bulletin board, and you can't even get it by running programs on that floppy disk. You've got to boot from the infected disk. How often do you boot from a floppy disk? Almost never, if you've got a hard disk.

But how often do you put a floppy in drive A to read some data and leave the floppy drive door closed? Almost always, if you're like most of us. That's when the virus zaps you. You reboot your system, not realizing that you've left the floppy in drive A with the door closed. You see the *disk boot failure* message, realize that you've accidentally tried to boot from a non-bootable floppy, and pop the door open and reboot.

But if the nonbootable floppy had a boot-sector infector on it, your hard disk is now infected. This is the way that virtually all of the boot-sector infectors spread.

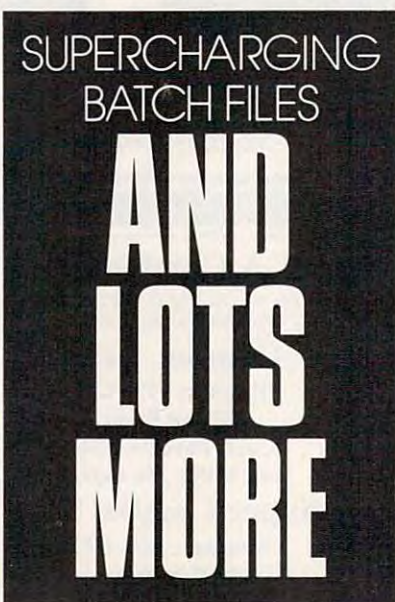
Get in the habit of opening the floppy drive door as soon as you're finished reading from it.

*Mark Minasi
Arlington, VA*

Fuel-Efficient Batch Files

Sometimes the speed of a batch file is important. For example, on older, slower hard disk systems or floppy-only systems such as laptops, you want your batch files to be as streamlined as possible. Very large or medium-size but poorly written batch files can try anyone's patience, regardless of the speed or capabilities of the machine. Following are a few tips for trimming every last second you can off a batch file's runtime.

- Replace all of your REMs with colons. Since each line must be reinter-



preted as a batch file runs, it takes a bit longer to recognize REM than a single colon. Plus, this method gives you a way to include nondisplayed comments without including @ECHO OFF.

- Start with @ECHO OFF. Displaying redirectable text (as all batch files do) is an incredibly inefficient process—all the more reason to get that @ECHO OFF (or just ECHO OFF in DOS versions previous to DOS 3.3).

- Put often-used labels close to the top

of a file. An innocent-looking line like GOTO TOP can be the worst offender. Batch files are read into memory one line at a time. A GOTO causes the batch interpreter to go back to the start of the file and search each line for a label called TOP. If TOP is on line 1000, 999 lines will be read every time the GOTO TOP statement is encountered. Instead, your batch file should be structured like this:

- Skip the area most often needed by GOTO labels.

```
GOTO STARTFILE
:LABEL1
```

```
...
:LABEL2
```

```
...
:STARTFILE
```

```
...
GOTO LABEL1
```

```
...
GOTO LABEL2
```

- Break a large batch file into smaller, more manageable units. A batch file of more than 200 lines is probably too long. If you have excessive GOTOs and IFs in such a file, you might be able to remove them by breaking the file up into several smaller files. Ideally, these files should have no more than 50 lines each.

- Create a RAM disk. You probably know already that a RAM disk speeds things up. Before scoffing at an expensive hardware solution, recall that many programs, such as VDISK, can work on that underused 384K above 640K on your AT. There's nothing wrong with a RAM disk just large enough to hold a slow batch file.

- Avoid COMMAND/C, used on DOS version 3.2 and earlier, and replace it with the newer CALL command. These are the commands used to execute one batch file from within another. Command returns to the calling batch file at the line after the CALL command.

*Tom Campbell
Irvine, CA* ☐



PROGRAMMING POWER

T O M C A M P B E L L

QuickBASIC isn't the only game in town, you know. There's an old new kid on the block, *PowerBASIC 2.0*, formerly *Turbo Basic*, and it merits the name. *PowerBASIC* is powerful in ways that its Microsoft rival doesn't even begin to touch. *Turbo Basic* was released several years ago, then hung up to dry by Borland. While *QuickBASIC* was upgraded constantly—and with fabulous success—*Turbo Basic* was a forgotten stepchild.

Borland finally returned *Turbo Basic* to its original developer, Bob Zale (who formed Spectra Publishing in mid 1990); released what was to have been *Turbo Basic* version 2; and renamed it *PowerBASIC 2.0*.

It's a killer product. Faster than the *QuickBASIC* native-code compiler, blessed with some incredible array-handling features and unheard-of accuracy in its multitude of numeric formats, and sporting dozens more keywords than *QuickBASIC*, *PowerBASIC* is a real contender.

PowerBASIC has a ton of hot new features. My favorites are the new array features, which let you sort arrays of numbers or strings in a single instruction far faster than if you wrote a quick sort routine; the communications support, which raises the ceiling from DOS's poky 9,600 bps all the way up to 115,000 bps; units, which act somewhat like OBJ modules but with error checking and much greater speed; and USING\$, which lets you format strings as if you were running them through PRINT USING, copying the output to a string variable instead of the screen. Much easier to use than C's sprintf() but serving the same purpose, USING\$ saves a lot of code in screen-intensive applications.

A state-of-the-art source debugger finally eliminates all those ugly PRINT statements you've been inserting in questionable areas of your programs. Conditional compilation, like C's #ifdef, lets you maintain several different versions of your program in the same file.

PEEK and POKE are cleverly extended to let you peek and poke strings (you can move whole screens with one instruction) and all types of numbers. Strings can fill all of memory, not *QuickBASIC*'s paltry 60K, and they can be up to 32K long each.

High Finance

An incredibly comprehensive variety of numeric formats and calculation routines brings *PowerBASIC* well to the fore of BASICs for the PC, making it by far the best choice for financial

terms without it, a slower option but one that produces results identical to those on coprocessor-equipped systems; or procedural math, which runs faster than 80x87 emulation.

The 80-bit extended precision values far outstrip the 64-bit "currency" type in Microsoft's \$500 *BASIC 7.0*, and there's nothing at all like it in *QuickBASIC*. It also appears to be much faster than *BASIC 7.0* or *QuickBASIC* in arithmetic calculations.

I have a few nits to pick, but they're strictly with the integrated environment. While the online help is markedly improved from *Turbo Basic*, it needs examples and more *See also* links. The help system in general is a bit antiquated, although it would've been the cat's pajamas three years ago. The language itself, however, is a breathtaking achievement. I can't wait to see version 3, but I'm in no rush—the horde of new features in this version will keep me happy for a long time.

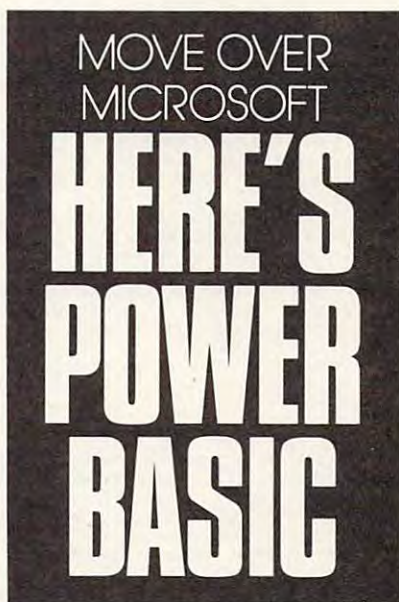
This month's program is called *J* for Jump. It's a shortcut for the CD command when you'd like to change to a directory on the path, even a directory on another drive. To use it, just enter

J partialsubdirectory

where *partialsubdirectory* is any sequence of letters that will identify the directory (which must be one of the directories on your PATH) uniquely. It can be any contiguous sequence of letters appearing anywhere in the name. For example, if your path is

```
PATH=C:\BIN;C:\DOS;C:\
BAT;C:\WORD5;C:\TC
\BIN;C:\PCTOOLS;
```

you can get to the WORD directory with the command *J 5* because only one directory in the path has a 5 in it. You could jump to the C:\PCTOOLS directory—even from a drive other than C—with the command *J P* because it's the only directory on the PATH with a *P* in it. So if you're in



calculations and those requiring high precision for scientific and engineering uses.

Round-off errors and low precision have always plagued computer users, resulting in frequent "that's not what I really meant" situations where accumulated round-off errors introduced by such innocent-seeming calculations as "1/3 of 100 expressed as a decimal value" can cause severe errors in a small number of repetitions.

You can choose 80x87 coprocessor support for top speed on those systems with a numeric coprocessor; emulation of the coprocessor on sys-



PROGRAMMING POWER

the D:\BUILDER directory and use the command J P, you're getting to the same place you'd otherwise have to type this to get to.

C: CD \PCTOOLS

If no directory on the path matches the name on the command line (that is, forms a superset of the set of characters on the command line), J prints a message saying so and quits, setting ERRORLEVEL to 1. Likewise, if you neglect to follow J with a partial directory name, you'll get an error message.

This month's program illustrates two unique *PowerBASIC* features, ChDrive() and local variables.

When J.BAS finds a directory matching your input and the directory contains a colon in position 2, J.BAS uses ChDrive() to log on to that drive. More interesting is the ParsePath\$ function. ParsePath\$ is given a string in the form of a PATH statement and an integer variable to track the current position in the string. It builds a directory name in the variable PPath\$, then uses that as the return value.

Note that the variables PPath\$, NextPos%, and NextChar\$ are declared as local variables. Local variables can only be used inside the SUBs or FUNCTIONs in which they're declared. Long a principle in other programming languages such as Pascal and C, local variables serve an extremely important purpose; they let you form an airtight seal around variables used only in one routine. That way they can't get changed accidentally by other routines that happen to use the same name—any number of other SUBs and FUNCTIONs can use these same names without affecting those inside ParsePath\$().

Because the only publicly visible variables ParsePath\$() can change are its parameters, ParsePath\$() is what's known as a reentrant routine. Even though the use of locals is one of the cornerstones of good programming, they're not available in all versions of compiled BASIC. Type LOCAL in the *QuickBASIC* environment, for example, and then press F1. All you'll get is the message *The LOCAL keyword is reserved for future use*. Well, the future is now with *PowerBASIC*.

```

' Compiled using PowerBASIC 2.10a
'
' J lets you jump to any directory specified on the path by entering
' J and just a few identifying letters of the directory name. For
' example, if you have a path that looks like this:
'
'   PATH=C:\DOS3;C:\POWERBAS;D:\BLDSRC\SRCT
'
' You can go to the BLDSRC drive and directory with the command
' line
'
'   J BL
'
' Force the command line to uppercase.
Match$ = Ucase$(Command$)
' Make sure there's a directory on the command line.
If Match$ = "" Then Call Quit ("Missing a directory. Example: J DOS", 1)
Path$ = environ$("PATH")
' Make sure there's a PATH in the environment.
If Path$ = "" Then Call Quit ("No PATH specified in your environment", 1)
' Position tracks our place in the PATH string returned by Environ$().
Position% = 1
' This is an endless loop, since terminating conditions are met
' inside it and all possibilities are handled by the Quit routine,
' which exits back to DOS.
do
' Copy the next semicolon-delimited directory name into NextDir$.
NextDir$ = ParsePath$(Path$, Position%)
' If a null string is returned, the program was unable to make a match.
If NextDir$ = "" then Call Quit ("Can't find "+Match$, 1)
If InStr(NextDir$, Match$) Then
' Match$ has been found within NextDir$. Change to the drive specified
' by NextDir$, if a drive is named. The Mid$() function looks at 1
' character in position 2 of the string--this is how we determine
' if there's a drive specification.
If Mid$(NextDir$, 2, 1) = ":" Then
' Found a drive. The ChDrive() function lets us change to a drive
' without requiring a colon following the drive specification.
ChDrive(Left$(NextDir$, 1))
' Strip off the drive designator and colon.
NextDir$ = Right$(NextDir$, Len(NextDir$)-2)
end if
' Strip off any trailing semicolon.
If Right$(NextDir$, 1) = ";" Then
NextDir$ = Left$(NextDir$, Len(NextDir$)-1)
End if
' The drive specification and the trailing semicolon, if any, have
' been removed. We have changed to the proper drive. Now let's
' change to the directory.
ChDir NextDir$
' Exit to DOS with an ERRORLEVEL of 0, meaning everything's fine.
Call Quit("", 0)
end if
loop

' ParsePath$ returns the next directory in the PATH by copying all the
' characters up to the next semicolon into the return value. Position%
' keeps track of the position in the string.
Function ParsePath$(InPath$, Position%)
' LOCAL variables trim code size and make code more maintainable.
' Making them local means they can't be used (or tampered with)
' outside of this routine.
Local NextChar$, NextPos%, PPath$
' Get the next character from the path.
NextChar$ = Mid$(InPath$, Position%, 1)
' Collect characters until a delimiter (";") or end of string occurs.
While NextChar$ <> ";" and NextChar$ <> ""
NextChar$ = Mid$(InPath$, Position%, 1)
' Add the next character to the return value.
PPath$ = PPath$ + NextChar$
' Keep track of where we are in the PATH variable.
Position% = Position% + 1
Wend
' The string we've collected becomes the return value.
ParsePath$ = PPath$
End Function

' The Quit() routine returns to DOS, printing Msg$ and setting
' the ERRORLEVEL to ErrorCodet. All exits from the program go through
' Quit().
Sub Quit(Msg$, ErrorCodet)
' Display the error message (or nothing, if the message is "").
Print Msg$
' Exit to DOS, setting ERRORLEVEL appropriately. By convention,
' an ERRORLEVEL of 0 means no error occurred, and 1 or more means
' something went wrong.
End(ErrorCodet)
End Sub

```




HARDWARE CLINIC

M A R K M I N A S I

PCs are big investments for homes or small businesses, so protecting that investment is important. The single biggest environmental threat to your PC comes from the very electric power that the machine needs to survive. Worse yet, power troubles don't come right out and announce themselves; they arrive in the guise of other problems. It's often hard to catch power problems in the act.

Have you ever experienced the following?

- A hardware problem that seems to jump around? One day it's memory, the next the disk, but it isn't repeated.
- A memory error that comes and goes?
- A PC that occasionally freezes up for no reason?

One of the most likely causes of these problems is either bad power itself or a bad power supply.

Surge of Power

AC power seems a fairly reliable thing; it keeps TVs, toasters, lamps, and the like running almost 100 percent of the time—at least in most of the U.S. And, it seems, one outlet's as good as any other. That toaster works just as well in the outlet on one side of the kitchen as in the outlet on the other side of the kitchen.

PCs *should* be as robust in their power needs, but they aren't, sadly. Like all other computers, PCs have a fairly refined taste when it comes to electricity. You see, your PC needs power the way you and I need air; it'll die quickly without it, and if it's dirty, performance will suffer.

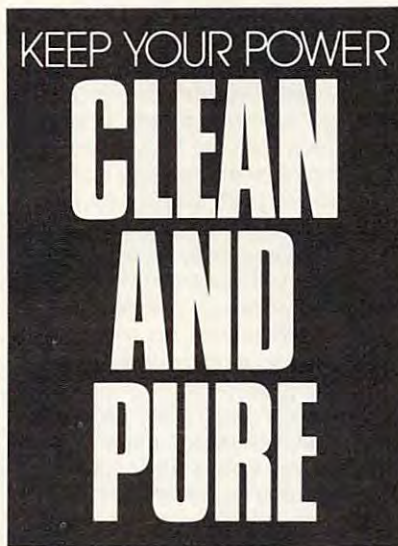
Problems with power fall into three categories: power surges, low voltage (brownouts), and no power (blackouts).

First, consider power surges. Surges come and go in a millisecond. You don't see them, they don't make the lights flicker, nor do they make the toaster burn your breakfast. They're

too brief for any of those things. But every one of those zaps can damage chips in your PC.

Your PC's chips are composed of silicon crystals; crystals are highly organized molecules, groups of atoms frozen into a particular pattern. Add some unwanted energy—a power surge, in this case—and a few atoms fall out of place.

Once that happens, the chip's effectiveness is diminished somewhat because the fallen atoms generally *remain* out of place. This isn't always true, however. Some chips are self-



healing to a certain extent, but much of this damage is cumulative. One day, you'll get that final zap that pushes the last critical atom out of place, and your PC is history.

What can you do about power surges? There are three things: Buy power protection equipment, check that you're not causing any surges in your office or home, and leave the computer on all the time.

Don't Turn Your PC Off!

"What?" I hear you saying. "Leave the computer on *all the time*?" Yes, it sounds odd, but there are good reasons for it. Every time you turn on an

electronic device, it experiences a momentary inrush current, a temporary surge of four to six times the usual current.

More specifically, the average PC system unit normally draws around 60–80 watts of power. Such a PC would see a brief surge of up to a half kilowatt of power, not a plan for PC happiness. (You can find out more about this in *PC Power Protection*, by Mark Waller, published by Howard Sams in 1989. It's a bit techie, so some of it is rough sledding, but it's packed full of power facts and worth picking up.)

Some people explain it this way: When do light bulbs most often burn out? Answer: When they're first turned on. That's a bit of an oversimplification, but the general rule is that electronic devices, PCs included, are happiest when left on all the time. Some of the most reliable electronic things in your house are left on all the time, including the thermostat that controls your house's temperature, electric clocks, and TVs. (TVs? Yes. Part of your TV is active all the time, like the part that responds to the remote.)

That's why I say to leave your PCs on 24 hours a day, seven days a week. We've done it at my company for years. Just leave the system unit on and turn the monitor off, turn the screen intensity down, or use one of those annoying automatic screen blankers so the monitor doesn't get an image burned into it. Turn the printer off, also.

Now, not all of you will be convinced to leave your machines on 24 hours a day. But here's a related tip that *everyone* should heed. I see lots of users who plug everything into their surge protector, then use the surge protector's on/off switch as a kind of master on/off switch for the PC and peripherals.

This has the unfortunate effect of causing all the power-on surges from the monitor, PC, and printer to happen *at the same time*, a worse situation than powering them up separately.>



HARDWARE CLINIC

To remedy that, some companies sell so-called power directors, those slim boxes that sit above the system unit and below the monitor. They cause a very short delay between the monitor power-up, printer power-up, and system unit power-up, so their surges don't interact.

Of the reasons to leave your computer on all the time, perhaps the most compelling is to protect your hard disk. One important component of your hard disk is the rotational motor, the motor that keeps the disk spinning at exactly 3600 rpm. You know from real life that it's a lot harder to *start* something moving than it is to *keep* it moving. (Ever push a car?)

Similarly, the rotational motor finds it much easier to keep the disk spinning than to start it spinning. When a hard disk won't start spinning on power-up, it's called *stiction*, and it's one cause of drive failure.

And there's another reason why you should keep the power on, as far as the hard disk is concerned. The initial power surge runs through *everything*, including the hard disk head. Let's suppose you don't park your hard disk head, so the head just ends up wherever it was when you turned the machine off. Now the surge goes through the head. It ends up blasting the data that happens to be sitting under the head with a "Bleahhh!" The surge blurs the data under the head. Obviously, autopark drives don't have this problem.

I know—you're having trouble believing that your drive's motor is happier working without a rest. But consider this: Do hard drives tend to fail more upon startup or at some random point during the day? Most failures that I've seen happen upon startup or boot time. Leaving the disk spinning avoids those troubles.

All of this advice is only useful, by the way, *if* (1) your machine remains fairly cool, 80 degrees or below, (2) you have fairly reliable power (there's no sense trying to leave your computer on all the time if you're going to end up losing power once a day anyway), and (3) you have decent surge protection—the next topic.

Shielding from Surges

Surges are caused either by noise on the power lines or by other devices on your power circuits. For example, copy

machines feed a fair bit of noise into the system; so do power tools and big motors, like the ones you see in refrigerator or air conditioner compressors.

That means that surges occur on a daily or, in some sites, an hourly basis. If the PC's power isn't properly isolated, it'll see surges every time the coffee maker, refrigerator, copier, or any other large power drain comes on-line.

Since we can't see surges, we tend not to be aware of just how common they are. So special devices have been invented that will monitor surges and report on their frequency of appearance. Such power line monitors cost a pile of money—some can run \$15,000 or more.

Most of us can't afford that, of course, but there's a much cheaper power line monitor from Tasco (2875 West Oxford Avenue, #5, Englewood, Colorado 80110; 303-762-9952; \$130). Called the AC Line Monitor, it plugs into any power outlet. Lights indicate the voltage level being delivered at the moment, as well as surges. Since surges don't last too long, the surge light comes on after a surge and stays on until you push the reset button. The monitor even makes an annoying buzz when a surge happens.

Once you've seen how common surges are, what can you do about them? Three approaches to surge protection are seen in the industry today:

- Inexpensive surge protectors use one-shot, kamikaze components to protect you from a single surge.
- Transformer-based systems are a bit more expensive but are reusable.
- Uninterruptible Power Supplies (UPSs) break down the power, eliminate the surges, and reform the power into textbook clean AC power.

Many of us have six-outlet power strips that are sold as surge protectors, costing from \$20 to \$100. Surge protectors are built around a device called a *Metal Oxide Varistor*, or MOV. A MOV is a device that can shield your PC from quite a lot of unwanted power for a fairly low price. But when it reaches its limit, it essentially disappears from the circuit—it affords no surge protection once it's dead—and allows the surges to pass right on through to the PC.

That's the troublesome part

about a surge protector: It dies eventually, and there's no easy way to find out when it's dead. Many of you reading this article may have surge protectors that are totally useless. There are some surge protectors that have a light on them that indicates whether the surge protector is still working or not. Surely this is enough surge protector insurance? Sadly, it isn't. When the light is out, the surge protector is surely dead. But if the light's still on, the surge protector *could* be useless.

It's amazing that so many surge protectors are sold when they provide such ephemeral protection, but there's a good reason. They're inexpensive, and nobody bothers to explain to consumers exactly what they are—or *are not*—buying.

Maybe that's why *power conditioners* aren't very well known, even though they're probably your best buy in power protection devices. A power conditioner is built around a transformer, and a transformer will, among other things, absorb an essentially unlimited number of surges. A power conditioner will additionally adjust your AC voltage up or down to compensate for variations in the power that your local power utility is providing. Why is this important? Well, where I live, for example, the local utility has some trouble providing a full 120 volts in the middle of summer, when electric demand is at its peak. So it compensates by dropping the voltage to 110 or 115 volts. I know when this happens because the power conditioner under my desk clicks when the input voltage changes. My PC's got nothing to worry about, however, because the power conditioner automatically steps the voltage back up to 120.

That's the beauty of power conditioners; they protect you from surges *and* low voltage all in one package. The bad news is the price. They're about three times the price of a surge protector. One good power conditioner, for example, is the Tripp Lite LC1200 (Tripp Lite, 500 North Orleans, Chicago, Illinois 60610; 312-329-1777; \$249), which can be found discounted at around \$150.

A power conditioner protects you from the first two power problems, surges and low voltage. But what about the third—*no* voltage, a blackout? That's for next month. □

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POINT & CLICK

C L I F T O N K A R N E S

That clicking sound you hear isn't a mouse button. No, it's chattering teeth, and it's coming from the makers of *Quattro Pro*, *Lotus 1-2-3*, and *Wingz*. Why are these guys so scared? *Microsoft Excel 3.0* (Microsoft, One Microsoft Way, Redmond, Washington 98052-6399; 206-882-8080; \$495).

Excel 3.0 is Microsoft's latest entry in the spreadsheet wars that seem to get hotter each year. For this new release, *Excel* has been entirely revamped, and while it certainly has new power, the topper is that it's now much easier to use. In fact, it's the easiest-to-use spreadsheet on the planet.

When you fire up *Excel* for the first time, you'll see one of its neatest new features—the toolbar, an idea borrowed from *Word for Windows*. The toolbar is a horizontal bar that rests under the menus and contains several groups of push buttons. The push buttons are primarily shortcuts for commonly used commands.

Let's take a quick look at the toolbar to get an idea of what it offers and to get a feel for some of 3.0's new features. Going from left to right, the toolbar has buttons for styles, promoting and demoting outline elements, auto-summing (which automatically sums rows or columns), bold and italics, alignment, selecting graphics objects, drawing (including line, rectangle, ellipse, and curve shapes), autocharting, creating text boxes, creating user-defined buttons, and recording macros.

One of these buttons, autosum, is especially useful. Because adding figures in rows or columns is the most common spreadsheet task, Microsoft created a special function to make this easier. To use autosum, place your cursor at the end of a column or row (where you want the total to go) and click on the autosum button. The program will place the SUM formula in the current cell and select the range for you. Autosum almost always chooses the right range for the sum, but when it doesn't, you can simply compress or extend the selection.

There are two other excellent new

timesavers that bear quick mention. The first is *Excel's* automatic best-fit feature for column width. To use this, you place the pointer between two cells and double-click. The program adjusts the width of the column on the left and makes a best fit for the data therein. Another timesaver lets you double-click on any cell that contains a note (these are identified by a small red dot in the upper right corner) to display the note's text.

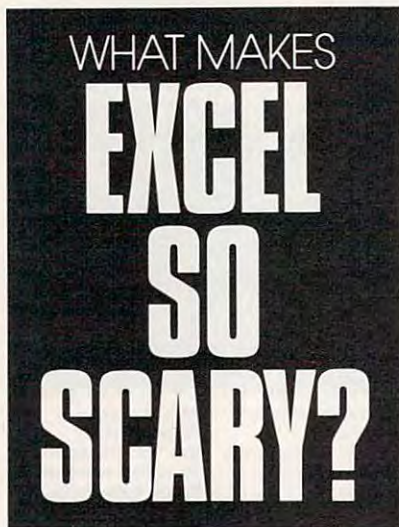
The new *Excel* is hip to fonts. Unlike version 2.0, which was limited to four fonts per work sheet, 3.0 al-

welcome is outlining. Outlining lets you structure your spreadsheet in a hierarchy, and more importantly, you can display selected parts of the spreadsheet based on that hierarchy. After using outlining, it seems like such a natural feature that I'm amazed it's taken this long for spreadsheet outlining to make it into a product.

To get a feel for how outlining works, let's say you're working on a balance sheet with several subtotals, each based on 25 to 50 items. By the time you've finished with the work sheet, it could easily contain 300-400 rows of figures, much too long to see the major divisions of your expenditures. The solution is simple with outlining. Select the range of figures that comprise each subtotal and demote them with the right-pointing arrow on the toolbar. You'll see a small "-" button and a line indicating the outline range of the button. Click on the button (which will change to a "+"), and your range will be hidden. Click on the "+" button to display the range again.

"It's better to look good than to feel good," says Billy Crystal, playing the host of "Fernando's Hideaway" on "Saturday Night Live," but it's best to look good *and* to feel good. While *Excel* certainly feels good, version 3.0 looks good, too. And one place it looks good is charts. In addition to the standard chart fare, the program now boasts eye-popping 3-D area, column, line, and pie charts. And you have complete control over your chart's rotation, perspective, and color. The only problem with these gorgeous graphs is that you can't export them to a standard vector format that service bureaus will accept.

The only major module of *Excel* not to undergo a full revamping was the database. To bolster this area, Microsoft has bundled *Q+E*, a database front end, with *Excel 3.0*. With *Q+E*, you can import *Excel*, *dBase*, and text files; edit them; and perform SQL queries. *Q+E* is an impressive database program in its own right, and combined with *Excel*, it's a powerhouse. □



lows you unlimited access to your system's typefaces. And to make it easier to work with fonts, the program now offers style control. You can access styles with the style combo box on the toolbar. To define a style, select an area of your work sheet and format it with the font (you can specify bold, italics, underline, or strikeout) and point size. Click on the style box and type in the name for your new style. From then on, the style will appear on your style combo box menu.

There's no question that this version of *Excel* is dramatically easier to use, but there are several important new power features, too. The most



INTRODOS

T O N Y R O B E R T S

No matter whether your system runs from a hard disk or floppies, disk real estate is always a precious commodity. There's never enough room, and there never will be. Computer users must continually cull unneeded files from the disk, and the first place to look should be your DOS subdirectory. Although it's possible to gain a fair amount of space by eliminating DOS files from disks, few make this move for fear of erasing something important.

The basic rule to follow in weeding out DOS files is that if you don't use it, you should lose it. Keep programs that are referenced in your CONFIG.SYS and AUTOEXEC.BAT files, keep files required by application programs, and keep programs you run regularly from the DOS prompt, such as CHKDSK and FORMAT.

Bear in mind, though, that most of the commands you type at the DOS prompt—instructions such as DIR, DEL, COPY, CHDIR, CLS, DATE, and TIME—are not kept in separate files. These commands, which are called *internal commands*, are all part of the system's command processor, COMMAND.COM.

Here are some general guidelines for what to keep and what to pitch. Don't be overly concerned about making a mistake. You're only deleting files from your *working disks*. If you learn later that you need a certain file, it's a simple matter to go back to your DOS masters and copy that file to your working disk.

Without a doubt, keep these files: CHKDSK.COM, COMMAND.COM, DISKCOPY.COM, FORMAT.COM, MODE.COM, SYS.COM, and XCOPY.EXE.

If you use a hard disk, keep FDISK.COM, FASTOPEN.EXE, BACKUP.COM, and RESTORE.COM. Most hard disk users, however, prefer commercial disk backup programs to the BACKUP and RESTORE commands offered by DOS. If you use such a commercial program, send BACKUP.COM and RESTORE.COM to the showers.

Files such as ANSI.SYS, DRIVER.SYS, RAMDRIVE.SYS, and SHARE.EXE may be needed for certain configurations. Generally, these files will be put into play by the system startup files. Check CONFIG.SYS and AUTOEXEC.BAT and keep the files your system needs.

Just these few files will keep 90 percent of computer users working smoothly and happily. The rest of the programs included with DOS are either designed for a specific need or have outlived their usefulness and are included with new DOS releases mainly for the sake of continuity and compatibility with older versions.



Consider the special tasks your system performs and retain only the files that will help you accomplish your goals. For example, programmers may need to use GWBASIC.EXE, DEBUG.COM, EXE2BIN.EXE, MEM.EXE, and LINK.COM, but others can safely eliminate those files. Another whole set of programs and files that can be eliminated consists of those that support code page switching, the process of switching in and out character sets for different foreign languages.

Since most of us live and work in the United States, we can ignore code page switching and all of its attendant files: COUNTRY.SYS, DISPLAY.SYS, GRAFTABL.COM, KEYBOARD.COM, NLSFUNC.EXE, KEYBOARD.SYS, PRINTER.SYS, SELECT.COM, and any file using the CPI extension.

Among the files you may or may not want to keep on disk are the three DOS filters—FIND.EXE, MORE.COM, and SORT.EXE. These programs perform valuable functions, but their usefulness has been eclipsed by increasingly powerful application and utility programs.

The files ASSIGN.COM, JOIN.EXE, and SUBST.EXE are DOS's "smoke and mirrors" commands. With the command ASSIGN A B, you tell the system to access drive B any time any program or user asks for drive A. SUBST allows you to define a shorthand name for a long pathname. These commands come in handy when you have a specific problem, but few computer users have a compelling need for them.

There are several files you may be better off without. RECOVER.COM is designed to help pull data off bad disks, but it has a reputation for making matters worse. EDLIN.COM is a terrible line-based text editor. TREE.COM attempts to show your disk's directory structure. PRINT.COM was handy years ago, but today's applications software has assumed the burden of printing and does a better job.

COMP.COM and DISKCOMP.COM compare files and disks to make sure they're identical. If you do need to compare files, use FC.EXE. GRAPHICS.COM is a memory-resident utility that must be loaded to print hardcopies of graphics screens. Some older software needs this support, but today's applications generally handle these details themselves.

LABEL.COM lets you assign an 11-character name to your disks, but most people simply label their disks when they format them. □

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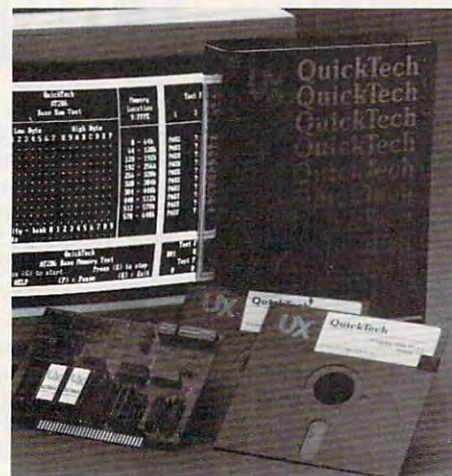
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ARTS & LETTERS

R O B E R T B I X B Y

Last time, after grouching a bit about the many shortcomings of *Windows*, I left off with the teaser that this month we would talk about graphics programs that don't run under *Windows* and, consequently, don't require waiting. The good news is that these programs are all faster than *Windows*. The better news is that a couple of the items discussed here are parts of operating system shells shipped with certain brands of computers, so you may already have the software.

To begin with, the creators of *WordPerfect* are always trying to repeat the magic in other areas of computing. Whether or not they have succeeded with *DrawPerfect* (*WordPerfect*, 1555 North Technology Way, Orem, Utah 84057; 801-225-5000; \$495) is up to the marketplace to decide. However, it is a quick, responsive package that comes packed with a collection of superior clip art.

If you're interested in using graphics with *WordPerfect*, *DrawPerfect* is perfect for you. Not content to create an adjunct to the most popular DOS word processor in the world, *DrawPerfect*'s originators created a presentation package that can be used to create either stand-alone computer-driven slide shows or graphics to be used within documents. A *Windows* version of *DrawPerfect* is planned by the end of the year, but the company will continue to manufacture and support the DOS version.

Harvard Graphics from Software Publishing (1901 Landing Drive, Mountain View, California 94043; 415-962-8910; \$495) is primarily a graphing program, but it contains a good drawing module. Unfortunately, the interface is about as confusing as it can be, and many users are stumped when it comes to moving an object on the drawing screen. Clip art seems to be permanently anchored in place unless you can find or figure out the extremely nonintuitive method *Harvard Graphics* uses to "unstick" it—pressing the backspace key.

AutoSketch (Generic Software,

11911 North Creek Parkway South, Bothell, Washington 98011; 800-223-2521; \$249) is a very capable tool for drafting. Its latest release is inexpensive, and clip-art libraries are only about \$50 each, list.

GeoDraw is a simple drawing program that comes with *GeoWorks Ensemble* (*GeoWorks*, 2150 Shattuck Avenue, Berkeley, California 94704; 415-644-0883; \$199.99). In its original release *GeoDraw* doesn't support curves (other than ellipses), but the *GEOS* operating system does support 24-bit color (for 16.7 million potential colors) and is fully object-oriented.

WHY WINDOWS
ISN'T THE
**ONLY
GAME
IN TOWN**

If anyone would be expected to have a high-powered alternative to *Windows* graphics packages, it's Digital Research (DRI), whose thunder was stolen early in the game when Microsoft (creator of *Windows*) released a jazzed-up version of the CP/M operating system for the PC and called it MS-DOS, which essentially wiped out DRI's CP/M.

DRI has come through with *Artline 2.0* (Digital Research, 70 Garden Court, Monterey, California 93942; 408-649-3896; \$595), which runs under a version of runtime *GEM*.

GEM stands for Graphics Environment Manager. It was an early alternative to *Windows* that never achieved the same level of popularity. *GEM* is known principally as the operating system shell for *Ventura Publisher* version 2.0 and earlier (the current *Ventura* release also has a *GEM* version).

Artline's kinship to *Ventura Publisher 2.0*, one of the most popular high-end desktop publishing products, is a recommendation.

There has been an update of *GEM* graphics files since the release of *Ventura*, so you will have to upgrade the software to use bitmap graphics from *Artline*. (The software for this upgrade is included with *Artline*, so this is no problem.) Encapsulated PostScript files from *Artline* can be used without upgrading *Ventura*, however.

The original *Artline* was a fine drawing program but little more than that. The current version, by contrast, is at the forefront of the industry in terms of features. It's comparable to *Corel Draw*, *Micrografx Designer*, and *Arts & Letters Graphic Editor*.

What features can you expect? Start with blends (gradual transformations from one shape to another), autotrace, text-along-path, node editing, and fountains. *Artline* can also create masks and merges, which play tricks with outlines.

Artline has full text capabilities, featuring a wide range of typefaces in sizes from 2 to 500 points. *GEM* has selector box settings, which are slightly different from *Windows*'s, that allow you to enter a value in a text box by sliding a bar up and down a scale with the mouse. This is more efficient than the up and down arrows *Windows* typically uses for this purpose.

There are some drawbacks with *Artline*. *GEM* isn't multitasking, so you have to wait for *Artline* to complete its entire drawing before you can proceed after a screen refresh. Fortunately, the view menu allows you to turn off fountains, eliminating one of the most time-consuming redraws. □

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MS WINDOWS 3.0

These programs require Windows 3.0.

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- Readability Plus (1340)** - A computerized writing style analyzer.
- Grab Plus/Laser Label (1883, 1884)** - Takes addresses from a word processor and sends them to the printer. **HD**

APPLICATIONS

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- Pharaoh's Tomb (1974)** - Face monsters and traps as you explore the pyramid. Your goal is to survive.
- Bass Tour (1925)** - Fish in your choice of lakes. Try to win the trophy.
- ZZT (1921)** - Test your problem solving ability and your arcade skills as you battle your way through 43 rooms.
- Field General (1931)** - Experience the excitement of a pro football game from a coach's point of view. **CGA, HD**
- Insanity (1936)** - Find your way out of this maze before going insane! **CGA**
- The Monuments of Mars! (1920)** - Many tough levels filled with puzzles, traps and creatures. **350K, CGA**

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- Dark Ages (1964)** - A brilliant arcade/adventure game with superb graphics and animation. **400K, EGA, 286 or faster machine.**
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TURBO PASCAL 6.0

TOM CAMPBELL

Some upgrade decisions are hard to make. I've been a staunch supporter of *Microsoft Word* for years now, but the change from 5.0 to 5.5 was too little too late. I had better things to do with \$75. And *Microsoft C* version 6.0 was such an obvious hiccup that some users actually made noises in public about getting their money back (on CompuServe's MSSYS forum).

But if you're a *Turbo Pascal* user and you've considered switching to 6.0, worry no longer. It's a shoo-in. And if you're new to systems programming on the PC and are considering versions of Pascal for your next project, look no further. *Turbo Pascal* version 6.0 is, simply put, a masterpiece. There's a whole new integrated development environment (IDE, in Borlandese); mouse support; totally revised help; additional debugger features; a massive, tightly integrated library of user interface routines called *Turbo Vision*; and numerous smaller enhancements. In fact, some of the demo code for *Turbo Vision* is good enough for commercial applications.

The Mouse That Soared

While the most important new features of version 6.0 are *Turbo Vision* and better data hiding, the most obvious change is its new user interface. If you're a *Turbo C++* owner, you'll be used to the changes. Otherwise, you're in for a big surprise.

First of all, it mouses. A Microsoft-compatible mouse will work exactly as you expect a mouse to work. A click of the left button selects menu items or buttons, a drag selects text, and dialog boxes now contain multiple fields that you can jump to quite easily with the mouse.

I love it, since I'm a mouse user. I have no idea how many people will disagree with me, but I feel the new user interface is much less efficient than previous ones for users not equipped with a mouse.

While earlier versions of the Borland IDE employed submenus instead of dialog boxes and allowed every item on the submenu to be selected by pressing the first letter of the menu item, the new IDE leans toward multifield dialogs that force the mouseless user to jump among the fields by pressing the Tab and arrow keys. This means that some commands that once required only a single keystroke now require several. Since I like to use the mouse,

this didn't pose a big problem with me, but I still appreciate a good, fast keyboard interface as much as the next person. *Turbo's* previous IDE was great that way.

IDEs of March

The second big change in the new IDE is multiple windows with large file capacity. They have scroll bars, zoom buttons, and close buttons, so using the mouse with the new edit windows is a breeze. And when you press F3 to open a file, the current file is no longer unloaded. The editor simply creates a new window, overlapping it on the previous one.

You can open as many windows as you like, but the first nine are instantly available via Alt and the window's number, from 1 through 9 (just like Microsoft's *QuickPascal*). Alt-0 brings up a list of active windows, including edit windows, help windows, register windows, and so on. While some people never get the hang of using several windows at once, I find it a lifesaver and demand it of any text editor or word processor I use.

Normally, I have about four windows open: the current source file, a text file explaining the source file, an ideas list, and another file or two related to the source (for example, other units). And you can now edit files up to a megabyte in size. Of course, you program using modern structuring and never use files that large, knowing that a well-designed software project is spread over many small, easily understood modules! Nonetheless, this large file size is handy for reviewing other people's code or large documentation files.

If you pay close attention to the windowing system, you'll begin to notice that all windows, not just edit windows, are used to their fullest potential. For example, you can use the Copy Example command from the Edit menu while perusing a help screen to place it in a temporary storage area called the Clipboard, then paste that code right into an edit window.

You can also select just part of any help window using the same selection techniques you use in an edit window. If you pop up a debug or help window, it becomes accessible through the Alt-number trick, and so on.

You now customize the integrated environment through TEMPL (Turbo Editor Macro Language), not the venerable TINST.EXE

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(TINST is now gone). TEMPL is a macro language with an external compiler. Unlike many high-level programmer's editors such as *Brief* or *EMACS*, there's no internal language interpreter. Instead, you add extensions via a separately compiled macro language. While this means that you have to learn a new (but simple) language and compiler to customize your environment, TEMPL gives you access to everything the integrated environment can do—far more than simply assigning actions to keystrokes. You can trigger any menu item, read from the Clipboard, quit the compiler, mark text, and dozens of other commands.

The vast number of new functions means that performance of the IDE is slightly less spectacular than it used to be, since there's a fair amount of disk swapping going on. However, the swapping is so well tuned that I never found it to be a problem on my 12-MHz AT; in fact, it's barely noticeable. My 386 is slightly faster, but the swap algorithms are so good the difference isn't pronounced. To put it another way, performance has dropped from great to very good.

This Is Demo Code?

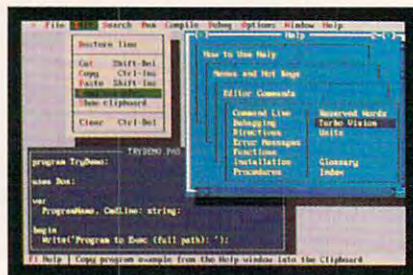
Borland has taken the concept of demo code to new heights by providing some outrageously good examples—easily good enough to be from its own library. My favorites are probably the EDITORS unit and the HELPFILE unit.

EDITORS has everything you need to add text editors to your own applications, the main limitations be-

One demo program called *TV-EDIT* sports multiple resizable windows, a pull-down menu interface, and shelling to DOS. If you've ever tried to write an editor—to say nothing of a mouse-driven editor with a separate command processor and multiple windows—you'll recognize that this can save months of work.

Help!

Now that you have a free text editor for your own projects, what can you do to document all those snazzy new features for the user? Well, you can use the help system written in *Turbo Vision*—that's what. The HELPFILE unit is a badly documented but price-less 800 lines of code that gives you everything you need to add hypertext help to your applications.



Turbo Pascal's new IDE supports mice, pull-down menus, and multiple windows.

Just write the help material in any text editor, add a few dot commands, and presto—help just like the pros. You can show related topics in another color and jump to highlighted topics by clicking with the mouse or pressing Enter (or choosing some other command and implementing it yourself, since the source to the help system comes with *Turbo Pascal*).

Here's the Beef

All this is very nice, says the hard-core programmer in you, but what about enhancements to the language? Where's the beef? In *Turbo Vision*, for one place. *Turbo Vision*, to put it simply, is an object-oriented user interface library with mouse support, easy creation of windows and dialog boxes, menus, scroll bars, check and radio buttons, and an event-driven programming paradigm.

The good news is that *Turbo Vision* is a brilliantly conceived and designed, completely debugged toolkit that comes with a 400-page manual and could easily be a separate commercial product. The bad news is that if you haven't learned objects yet, you must learn them to use *Turbo Vision*. And the implications of an event-driven environment—that the user has full control over all actions, that any action should be revocable, that the user interface of your program



With the debugger, you can sail quickly through the object class hierarchy.

ing that file sizes are limited to 64K, maximum file size must be determined when the editor is initialized, and there's no word-wrap.

On the plus side, EDITORS can save and load files, has full cursor motion, does search and replace operations, and dynamically resizes the edit window. It mouses, too. The command processor is separate from the user interface, so you can give your editor the modest look of a *WordStar*-style screen or a flashier *Windows* look. Or both at once.

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should look very similar to the user interfaces of other programs using *Turbo Vision*—mean that you may well have to change your way of thinking and programming.

Chances are good that you won't be able simply to plug your old applications into this new framework. If you've programmed Mac or *Windows*, *Turbo Vision* will be a cakewalk. Otherwise, plan on spending at least a few weeks becoming familiar with a lot of new concepts.

Another gigantic addition is the inline assembler. A complete sym-

bolic assembler with simplified segment directives lets you write assembly code without ever leaving the *Turbo Pascal* environment. The inline assembler itself is reasonably well documented, but look elsewhere for tutorials or even a reference for PC assembly language. Still, it competes quite effectively with *Microsoft's QuickC with QuickAssembler*.

The awkward `{SF}` directive for forcing near or far calls can now be overridden with the more conventional near and far directives, new keywords that act just like their coun-

terparts in C. This lets you alter the standard subroutine calling convention *Turbo* provides so that you can speed up your code or use *Turbo* to call code written in other languages (such as the inline assembler).

I have always appreciated Borland's documentation for its unique respect for the user. Some amazing nuggets can be found in the supplementary documentation on disk, and it's the kind of information that you'll realize you need only when you're deep into a project and need nuts-and-bolts advice from someone who's been there.

For example, one of the DOC files for *Turbo Vision* explains such eminently useful issues as which parts of it can be overlaid (everything except for one small unit that manipulates interrupts), how much EMS can speed things up, how to set up the overlay pool, and how *Turbo Vision* objects are inherited (so you can best override them when writing new objects). Borland's documentation abounds with details like that, and, while they may seem extraneous, they can mean the difference between making or breaking a deadline.

Is It Worth the Upgrade Price?

The bottom line is always this: Does the new product offer you enough new features to merit its upgrade price? In the case of the new *Turbo Pascal*, the answer is an unequivocal *Yes*. Reviewers almost always get their software free, so you should always factor that into your evaluation of their work. But I paid for my upgrade and didn't even think twice about it.

I would cheerfully have paid just for the new development environment and *Turbo Vision*. But it also came with better object orientation through encapsulation, better code generation, the inline assembler, a gigantic new help system for the compiler itself, help code for your own applications, a new heap manager, the OBJECTS unit, and even more goodies that I haven't mentioned yet.

If you're shopping around for a Pascal, shop no more. *QuickPascal* is a dynamite product and less expensive, but it doesn't hold a candle to *Turbo 6.0*. *Microsoft Pascal* is a fine ISO standard Pascal and your only choice if portability to mainframes and use of older, pre-*Turbo* code is paramount. But if you want to develop state-of-the-art software using state-of-the-art Pascal development tools, look no further. □

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ONLINE

D E N N Y A T K I N

You think you've finally mastered the operation of that intimidating metal, plastic, and silicon beast on your desk. In fact, you're confident enough using your personal software that you decide it's time to reach out and touch some other computers. After perusing the manuals, you log on to an online service for the first time. The chat line looks interesting, so you select it from the service's main menu.

Messages flow down your screen, but what are these people talking about? You try to follow the conversation, but it's filled with strange terms and indecipherable acronyms. Despite all your research and studying before you logged on, you don't seem to be able to speak the language.

The best way to approach anything with a computer is to read the manual. Most problems can be solved by a quick check of the documentation. However, you can't get a manual for your local BBS system. And the documentation provided by most online services is superficial at best. Even if the manual is thorough, it's not going to teach you online lingo.

Don't despair, though. Almost everyone online learned by trial and error. Just because you're a newbie doesn't mean everyone will be ROTFL if you flub a post. But to help you get started, here are some of the more common examples of online jargon and acronyms (STEVE and the rest of the gang on People/Link helped fill in the gaps in my personal jargon dictionary).

Newbie: Someone new to a particular online service, BBS, or modeming in general. Newbies are often afraid to post anything publicly or ask for help, even though everyone else is usually happy to assist them.

Lurker: Someone who "lurks" on a BBS or online service without posting messages or uploading files. Actually, most users are lurkers—the vast majority of messages are posted by a few vociferous folks.

Emoticons: These are ASCII graphic

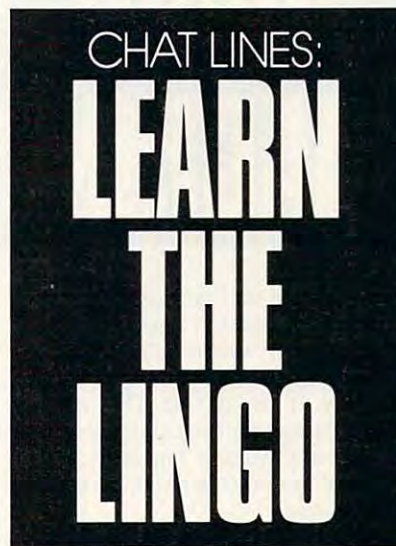
faces used to express emotions in online messages. There are probably hundreds of variations, but some of the most common include

:-) Smiley face, used to indicate laughter.

:-(Frowny face, used to indicate disappointment or anger.

;-) Winky face, used to indicate a joke.

:-/ Wry face, used when something's funny in a bad way.



B } Cool shades face, an example of one of many possible variations.

Post: Another word for an online message, as in *Did you read Kim's post?*

Nets: Networks, used to describe the commercial online services as well as Usenet and BBS networks like WWIV and FidoNet.

Lamer: Someone who only downloads files, never contributing new files to the BBS or service.

Those are just a few of the terms you'll encounter while reading the message bases. Things get really weird, though, when you enter one of the live online chat lines. Chat users have developed an elaborate shorthand system to keep typing to a mini-

mum. Here are just some of the common abbreviations.

BCNU: Be seeing you. Used when you're about to leave a conference. It's considered rude to enter or exit a conference without saying hello or goodbye.

BRB: Be right back. If you're going to be walking away from your computer or temporarily leaving the conference, it's nice to let people know. (Also, **AFK:** Away from keyboard.)

BTW: By the way.

CU L8TR: See you later.

<g>: Grin. Synonymous with :-).

GA: Go ahead. Used after typing a long series of lines to let people know that they can now talk without interrupting you.

LOL: Laughing out loud.

Nytlol: Good night, all—not the insomnia remedy.

ReHi: A greeting used when someone leaves a conference and then comes back.

ROTFL: Rolling on the floor laughing. Used after something *very* funny is said. (Also, the shorter ROTF and OTF.)

RTFM: Read the freaking manual. Used when somebody asks a question that could have been easily answered by checking in the manual.

Spam: Information that might not be legitimate or real, as in *This rumor may have a high Spam content.*

TINAR: This is not a review. Used before a user-written review on BIX, where the users aren't allowed to post product reviews. Of course, almost everything prefaced by TINAR actually *is* a review.

TNX: Thanks.

TNX 1.0E6: Thanks a million.

TTYL: Talk (or Type) to you later.

There are lots of other terms and acronyms, some specific to particular online services, but this dictionary should be enough to get you started. BTW, you can contact me on GENIE and BIX as DENNYA, on CompuServe as 75500, 3602, and on People/Link as DENNY. BCNU on the nets. ☐



WORKPLACE

D A N I E L J A N A L

Everyone loves a good mystery—except when it concerns your computer. And when that computer is essential to your home business, a mystery is almost certainly murder most foul.

One night after work, just recently, I installed a new software program that I was sure would help me create better-looking documents. It didn't take long to discover that the software I had just bought didn't work properly without a companion program—which I hadn't bought. So I went back to my trusty, old program.

That's when the problems started. The software didn't load.

I panicked. I couldn't work without my old software, which reads all the files I've created over the past five years.

I called my favorite computer guru, who patiently walked me through the vagaries of CONFIG.SYS, HIMEM.SYS, and other DOS combobulations. He suggested that my new program had corrupted the other files. That made sense. I took the new program off my hard disk and reconfigured the system. The problem persisted.

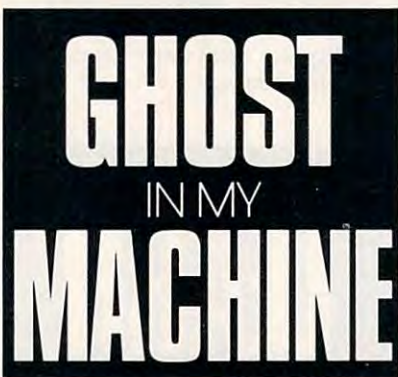
I called the folks who had sold me the computer. They couldn't have been nicer, even though the warranty had expired months earlier. I returned the computer, and they spent four hours (for free!) looking at the system, testing parts, and making backups. That's when we found a problem—the command file for my word processor was corrupted. We reasoned that the sector of the disk upon which the file was stored had been damaged by the hard drive head hitting the exact same spot 40 times a day, every day, for the past 10 months.

I was so relieved that I promptly ordered two megabytes of memory so it would run my new software program more efficiently. The technician even upgraded my ROM BIOS for free.

But I had forgotten Janal's Theory: If something can go wrong, then two things will go wrong, so you can't

do an independent, scientific test to pinpoint the first problem.

I reloaded my word processor. It worked, but then my checkbook program froze. I figured that the new memory was bad. Or maybe that the new BIOS was to blame.



I lugged the computer back to the store. They couldn't figure out why my computer had locked up. They copied my checkbook program to the D drive. It worked fine. They reset the memory and exchanged the new BIOS for the old. We didn't have an answer, but my computer worked. I lugged it back home.

I loaded the word processor again and typed a few lines. The cursor stopped dead. I repeated my actions ten times with the same results. I'm not a computer expert, but I figured something had to be wrong.

I returned to the repair center for the third time. I set up, typed away, and waited for the lockup. Of course, it didn't lock up at all. Very embarrassing. It was here we entered the computing Twilight Zone. The technicians wondered if the problem might lie in electromagnetic fields in my office. "Was there any new construction near your office?" they asked. Maybe. "Well, put aluminum foil around the bottom of the computer," they said.

Then I noticed two clues. The computer was lying flat. I turn mine on the side. Could that be it? We used their keyboard. I drove home and got

my keyboard. We plugged it in, and I typed away. The computer froze. And it froze immediately after I invoked a TSR. Things were getting interesting. Was it my keyboard, or was it my TSR?

I headed home, feeling like I'd finally solved the mystery. Once in my office, I set the unit on its side, wrapped it in aluminum foil so it resembled my Thanksgiving turkey, plugged in a keyboard from an old computer, removed the TSR, typed a bit, and then left the room for an hour. When I returned, I found the computer running fine. No problem, I thought.

The next day, I turned the computer on and heard two odd beeps. *XCMOS Checksum Error*, the computer told me. Another mystery. One friend suggested I replace the batteries. Another thought there was a hairline fracture of the motherboard. I wondered if that would be covered by major medical. My computer seems to work fine—even with the error. Maybe it just needs a little tender loving care.

Still, I expect it to die any minute. But before that happens, I'd like to propose a few strategies to help you deal with computer problems that arise in your home office:

- Make copies of your files regularly and store them somewhere safe, outside your house.
- Buy your computer from a reputable dealer who offers good service.
- Before buying a computer from a mail-order company, make sure the firm has a good reputation and a good service attitude. Be informed.
- If you buy through the mail, you'll want to find a local computer doctor with a good reputation. Compare carry-in and on-site service rates.
- Never introduce two new elements to your computer at the same time. If one part is bad, you'll have trouble pinpointing the culprit.

As for me, I think that my computer is haunted. □

PC Productivity Manager

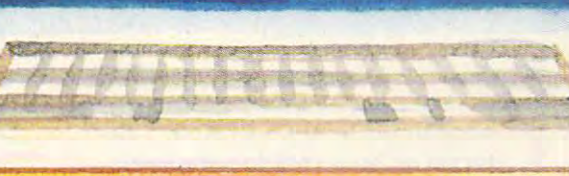
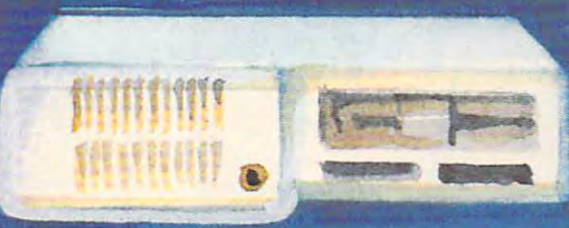
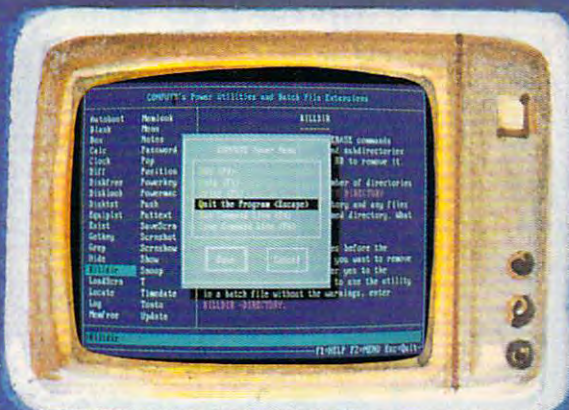
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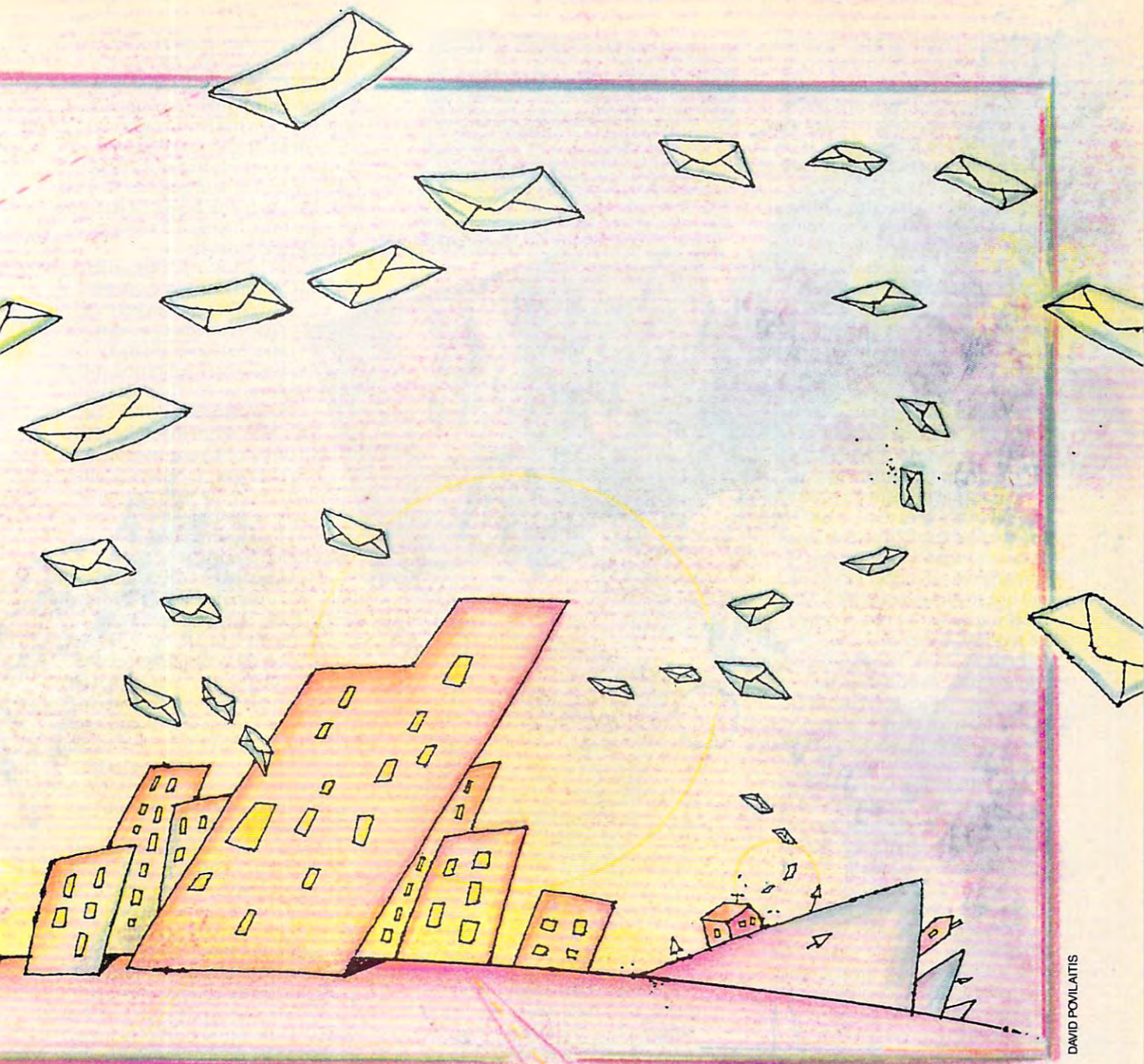
Postal rates skyrocket. Letters take days to traverse three states, nearly a week to wend their way from California or New York to your home office in the heartland. Messages get lost in the hog pile of junk mail.

Your home office demands reliable and rapid communications. Since you're trying to do it all yourself—perhaps running your business from home, moonlighting, or maybe doing day work at night—a break in your link to the outside world can be disastrous.

Electronic mail, or E-mail, can keep you connected 24 hours a day, seven days a week. You can maintain business

relationships, develop new leads, and improve your at-home productivity with round-the-clock communications. Faxes can, of course, do much of this, too, but a fax machine costs at least \$500. For less than half of that, you can equip your computer with a modem and E-mail software to integrate your communications with the rest of your PC work.

E-mail is actually a very specialized form of telecommunications. Like other forms of telecommunications, it uses computers, telephone lines, and modems to transmit information. Often designed to mimic paper mail, E-mail uses such familiar terms as *mailbox* and *address*, and



DAVID POVILAITIS

often charges for each message delivered, just like the post office. E-mail goes beyond simple messaging, though, to offer fax, telex, paper, and overnight delivery options. Increasingly, it doesn't matter whether the recipient has a computer.

In a crowded, busy home office, you want to make electronic mail as easy as possible: as simple as dropping a letter in the mailbox. Several software packages and integration techniques can turn your PC into a personal letter carrier.

E-Mail for the Masses

Of the 15 to 23 million E-mail users worldwide, most zip messages across pri-

ivate internal networks at major corporations. For those of us at home, though, it's the public E-mail networks that count.

MCI Mail is perhaps the best known of these services. Although it uses a stiff and outdated interface, MCI Mail holds the most promise for home office users. That's because of its popularity among business users. If your customers and clients use an E-mail network, they probably use MCI Mail—or a network you can reach through MCI Mail. Not only can you send text messages, but you can also transmit faxes and telexes, post paper mail, and even drop off mail to a CompuServe subscriber's mailbox. ▶

MCI Mail's Preferred Pricing option lets you send up to 40 messages (including faxes) for a flat fee of \$10 per month. It's perfect for home office workers. And since you connect with MCI Mail via an 800 number, it doesn't cost extra to check for mail throughout the day.

CompuServe is an interesting alternative to MCI Mail. The giant online service features excellent E-mail capabilities that connect you to its three-quarter million subscribers. More important, you can also exchange messages with MCI Mail addresses and send faxes. If you're using *CompuServe Information Manager* to navigate the online service (highly recommended), you can easily compose mail offline and then connect when you're ready to send. There's no additional charge for E-mail, but you pay the normal rates, or 21 cents per minute if you're using a 1200-bps modem. End result? You pay about the same to send a message to a CompuServe subscriber as you do to send one to someone on MCI Mail.

If you subscribe to a different online service—America Online, People/Link, PC Link, Prodigy, GEnie, or Delphi—you can post electronic mail to any other subscriber. Ease of E-mail varies from service to service; America Online makes E-mail a snap, primarily because of its *GeoWorks Ensemble* interface. Delphi and GEnie, however, can bring beginners to their knees. Prodigy makes you pay for each message above the 30 free you're allowed each month.

All share a flaw, though. The recipient must subscribe to the same online service as the sender. You can't guarantee that everyone you want to reach will be available through your designated E-mail service. It's as if each state had its own postal service and couldn't swap parcels with its neighbors.

A solution comes from DASnet, an interpreter for more than 60 E-mail services. You keep your current E-mail network but send messages to DASnet instead, which first translates and then retransmits the mail so that it's understood and accepted by the recipient's service. DASnet isn't cheap—you pay \$4.75 a month and around \$0.75 per message. But it has the advantage of extending your E-mail reach to include virtually anyone with an electronic mailbox.

Manage Your Mail

In the frantic, every-minute-counts home office, E-mail had better be almost as easy as licking a stamp. Your PC promised to free you from drudgery and let you concentrate on turning a profit or staying productive at home.



GeoWorks offers a high-potential package. PC Tools Deluxe features an integrated word processor. Express cures your E-mail headaches.

The ideal scene would be something like this: You're writing with your word processor, and you decide to send a message to a client in California. You type out the message, pull down a menu, and pick *Send Mail*. Choose the customer's name from a list that appears and hit Enter. That's it.

Unfortunately, things aren't that simple—yet. The best you can hope for is some help with and shielding from the intricacies of E-mail. Something to protect you from interfaces only a techie could love.

If you're using MCI Mail, *Lotus Express* can automate many of your E-mail tasks, including calling MCI, retrieving and sending messages and files, and even regularly checking your

files, and even regularly checking your mailbox for new mail. *Express* is a memory-resident program, so you can call it up from within most applications and then put it away when you're done. It also simplifies the complex job of sending spreadsheet, word processing, and graphics files via MCI Mail. But don't expect a dazzling interface from *Express*; it's several years old and looks it.

PC Tools Deluxe 6.0 also offers some MCI Mail assistance. As with *Express*, you can keep *PC Tools* in memory so that it's just a hot-key press away, no matter what application you're working in. *PC Tools'* communications module includes an MCI Mail script that calls MCI and then downloads waiting mail or uploads your messages. Unlike *Express*, *PC Tools* won't automatically check your mailbox or upload files. As a simple mail retriever and transmitter, though, it works well.

PC integrated packages offer mail tools, too. Integrated software components usually share and swap data with little effort. In *Microsoft Works*, for instance, the communications module links you to your E-mail service, and the word processor composes mail and saves the messages to disk. You save time because you don't have to quit one program and run another to switch from writing to mailing; instead, you just switch windows.

Another way to integrate E-mail into your PC workday is with a multitasking environment like *DESQview*. Potent on a 386, *DESQview* lets you keep several programs active simultaneously. *DESQview* also gives you limited cut-and-paste capability, so it's possible to compose mail in your favorite word processor and then paste the text into your E-mail manager. *DESQview* can be temperamental, though, and you may spend lots of time tinkering with it in an attempt to get everything working smoothly. Unless you're an experienced PC user or familiar with *DESQview*, consider another direction.

That direction, and potentially the path to E-mail of the future, lies in graphical operating environments like *Windows* and *GeoWorks Ensemble*. Both point-and-click products put a lot of stock in integrating your work and in connecting applications to their documents. Although *GEOS* applications are scarce and typically underpowered, you can use *GeoWrite*, a *GEOS* word processor, to write messages and then create a workable E-mail manager with *GeoComm*, a communications program. Multiple windows, cut-and-paste capabilities,

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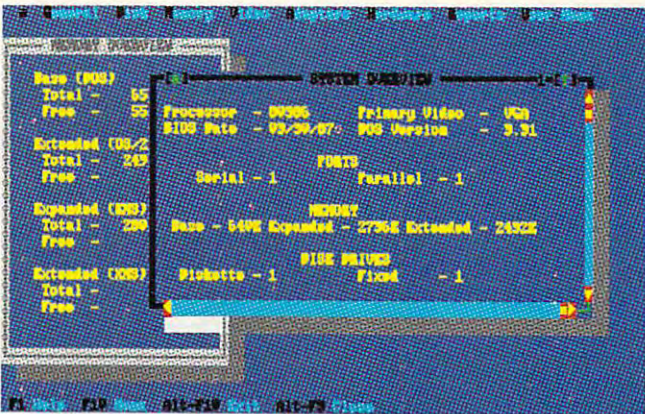
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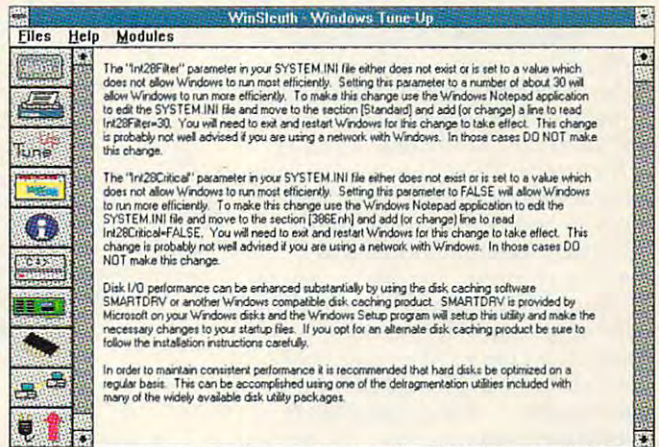
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and multitasking in both *GeoWorks Ensemble* and *Windows* let you quickly compose mail, copy it to a clipboard, jump to a communications window, and paste in the message once you're connected to the service.

Make E-Mail Easy

Stick with what you know. That's the best way to ease into E-mail. Rather than depend on the limited text editor that accompanies your E-mail manager, compose mail with your word processor. You know its commands, it probably includes a spelling checker, and it can certainly save work as ASCII files, the preferred format for E-mail.

Some E-mail managers work in the background. In other words, they'll send and retrieve mail while you work on something else. *Lotus Express* can run like this, as can *PC Tools* under *DESQview*. Multitasking environments such as *GeoWorks Ensemble* and *Windows* offer background telecommunications as a matter of course. The idea sounds intriguing, and you may be tempted, but for most home office workers, smoothing the wrinkles associated with background E-mail isn't worth the trouble. You may spend hours testing and retesting and then, because you're a small-volume E-mailer, only save a moment or two each day. Be sure the payoff is worth the effort before you get in too deep.



**E-mail's a window away with Works.
DESQview is a multitasking shell.**

One of E-mail's greatest assets is its portability. You can take your mailbox with you wherever you go, if you use E-mail. If you travel with a laptop computer, equip it with a pocket modem (Practical Peripherals makes a great miniature 2400-bps modem) so you can read and send mail on the road.

Another E-mail bonus, especially when you're using an online service as your mail provider, is easy file transfer. Services such as America Online, which uses the *GeoWorks Ensemble* interface, are especially adept at simplifying the process. In America Online you can attach a file to an E-mail message. It doesn't matter what kind of file it is—*WordPerfect* document, *Quattro Pro* work sheet, or *PC Paintbrush* graphic—America Online ships it to its destination with a few clicks of the mouse. You can cut costs and delivery time by sending files rather than expressing disks.

Finally, look in your mailbox. Do it religiously. *Lotus Express* checks your mailbox for you at regular intervals, but you've got to take the initiative with other E-mail managers. I look at MCI Mail first thing at 9:00 a.m. and last thing at 7:00 p.m. I also check CompuServe once a day and America Online three times a week.

Neither Snow, nor Rain. . . .

Adding E-mail capabilities to your home office won't bankrupt you. You can pick up a 2400-bps modem and E-mail management software for just a bit more than \$200. The cost may be small, but the benefits are huge—constant communications that are more likely to be read and answered than traditional letters.

If you're unsure about an E-mail strategy, start with MCI Mail and a simple E-mail manager. I recommend *PC Tools*; it's a painless way to get and give mail. The *DESQview* alternative is tantalizing but ultimately unwieldy because cut-and-paste operations between applications are so awkward. Nothing beats the slick way you click from word processor to communications/E-mail manager in an environment like *GeoWorks Ensemble* or *Windows*. I like *GEOS* and hope E-mail management becomes part of that operating environment's software soon. And I'm following the development of PC contact software like *Act!*, which is rumored to include E-mail connections in its next version.

Today, E-mail is a viable alternative to the phone or the fax. More important, though, is the power and convenience of E-mail. Something that provides instant access to your clients, customers, and coworkers is addictive—so addictive, you may never want to lick another stamp. □

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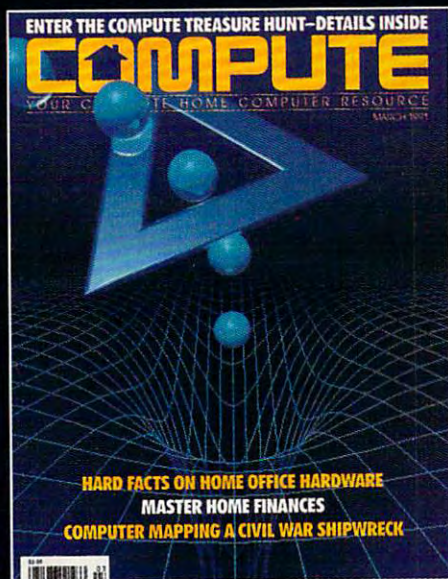
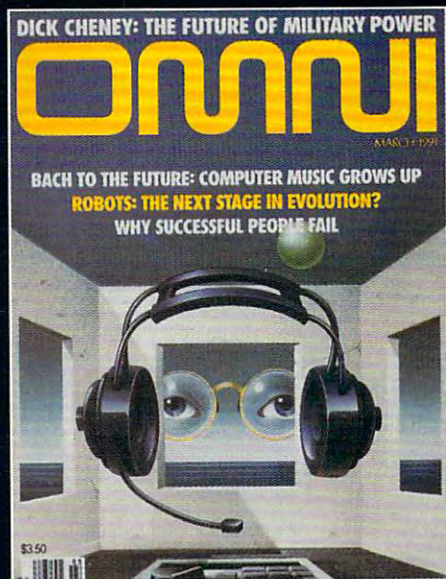
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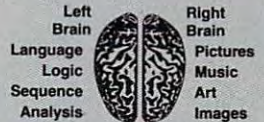
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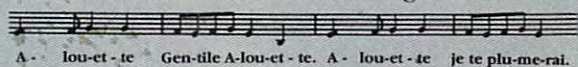
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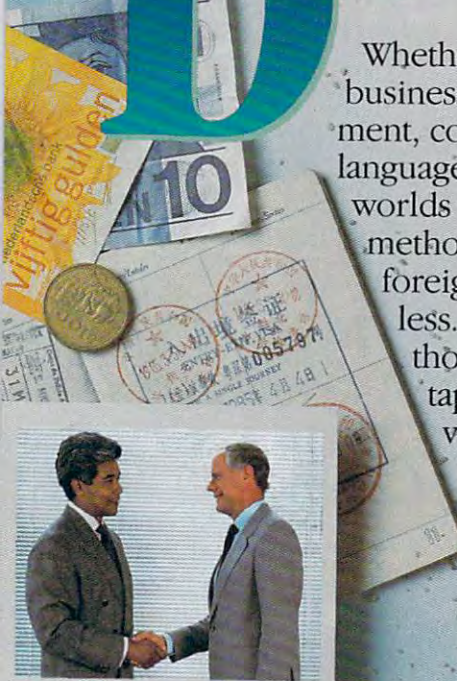
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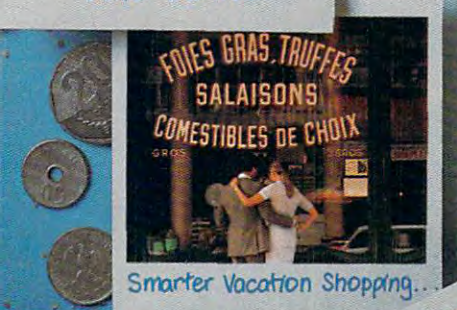
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The New York Times
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